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ABSTRACT

This curriculum guide is designed to train students who will assist in planning, designing, producing, and using media and multimedia materials. It offers a 2-year, competency-based, post-secondary program of studies in media technology, and uses an interdisciplinary approach drawn from the broad areas of art, business management, drafting, library science, photography, printing, television, and typing. Two levels of attainment are provided: The media equipment technician level, reached after completion of the first year, and the multimedia technician level, reached upon completion of the total program. The units of study (drawn from significant features of each discipline above) are organized into 10 components. First year components are media equipment, drafting, and circulation; second year components include commercial art, typing, planning and presentation, and management. Units in printing and software production are offered for both years. In addition, hours are allotted each year for the 10th component--(Prescriptive), which allows for individualized studies according to student needs. Presented in each unit are the number of hours required, specific objectives, list of basic content, suggested learning activities for classroom and laboratory, and a list of equipment or supplies needed. The introductory section includes a student progress chart. (RG)

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State of New Jersey
Department of Education
Division of Vocational Education

# A MEDIA TECHNOLOGY CURRICULUM

VT-103-010

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Curriculum Laboratory
Rutgers – The State University
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May 1976

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## PREFACE

## AN INTERDISCIPLINARY CURRICULUM FOR A POST-SECONDARY MEDIA TECHNOLOGY PROGRAM

There is general agreement that audio-visual media are increasingly important in education, industry, and government. Because of this, it behooves vocational educators to consider the development of a career program to train capable practitioners in the art of developing materials for audio-visual presentations of various types.

While there are vocational programs in New Jersey that teach certain skills that can be adapted for the above purpose, there is at present no instance where an organized effort is being made to train *broadly competent, versatile media technicians.* In some schools a student can get some drafting skills, but *only if he/she studies to be a draftsman;* in some schools a student can get some commercial art skills, but *only if he/she majors in commercial art.*

This proposal looks to a new curriculum. It would be an *interdisciplinary curriculum* which could be implemented in most cases without adding new facilities.

Let us assume a post-secondary, two-year program wherein the following disciplines *merge* to become one new curriculum – *The Media Technology Curriculum.*

Drafting
Commercial Art
Graphics
Photography (Still)
Photography (Moving)
Electronics (Audio and Visual)
Television
Cataloging Materials

It is not for one minute suggested that all these disciplines be treated exhaustively, but that there be *excerpted from each* those skills and theories applicable to our proposal.

Let us look in a general way at what the student could learn . . .

From Drafting –

- Technical illustration for printed materials
- Lettering for printed materials
- Drafting for overhead transparencies
- Drafting for color slides
- Lettering for movie captions, etc.
- Charts and graphs for live and media presentations

From Commercial Art –

- Art for printed materials
- Cartoons for printed materials
- Art for overhead transparencies
- Art for posters
- Art for movies and television
- Layout work

From Graphics –
- Reproduction of materials by various duplicating machines
- Graphics photography

From Photography (Still) –
- Photo composition
- Camera work
  - lighting
  - filters
- Dark-room operations
  - development
  - enlarging and reducing

From Photography (Movies) –
- Script development
- Staging
- Camera work
- Editing
- Splicing
- Captions
- Projecting

From Television –
- Script development
- Staging
- Camera work
- Monitoring

From Electronics –
- Audio recording
- Sound track on movies
- TV taping

And –
- Care and routine maintenance of equipment
- Principles of effective media

With such a curriculum, we can reasonably expect to develop a well-rounded, versatile technician who can fill a growing need in many areas.

Benjamin Shapiro, Director
New Jersey Vocational-Technical
Curriculum Laboratory

## ACKNOWLEDGMENTS

Developing this program of studies in Media Technology required the efforts and assistance of many individuals. The concept, the need for, the nature, and the scope of this program originated with Benjamin Shapiro, Director of the New Jersey Vocational-Technical Curriculum Laboratory at Rutgers. We are grateful to him and to Thomas W. Byrd for assisting with the funding proposal, and to Donald C. Springle, Superintendent of the Camden County Vocational Schools, for presenting it to the Vocational Division of the New Jersey State Department of Education.

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William Auge – Media Equipment Component
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Charles Ebbecke – Drafting Component
Pamela Henderek – Commercial Art Component
J. Evans Jennings – Software Production Component
Mary O'Hara – Circulation Component
Donald C. Proebstle – Drafting Component
Marion Shapiro – Editorial Work

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Claude S. DiGenova
Project Coordinator

April 1976

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## Need for Trained Personnel

Education, government, and industry all require precise communication if they are to carry on their work efficiently and effectively. To do so they need capable practitioners in the arts of planning, designing, and developing media materials that are uncluttered and to the point.

Although this need is quite obvious within government and industry, it is most apparent in education, where the major criticism of commercially packaged materials is their inability to meet the needs of teachers and students.

Too often instructional objectives within the classroom are compromised because of the limitations of teaching materials.

Broadly competent, versatile media technicians, with abilities in planning, designing, and developing media materials that meet specific, defined needs, could add dimensions of clarity and understanding to all communication efforts within schools, government, and industry.

Local government agencies and private industries too small to require specialists in the individual media fields would be able to use the many-faceted skills developed in individuals who successfully complete a course such as this.

## The Media Technology Program

A two-year, competency-based, post-secondary program of studies in media technology has been developed. This program offers an interdisciplinary approach drawn from the broad areas of art, business management, drafting, library science, photography, printing, television, and typing.

Significant features of each discipline have been extracted and organized into units, and the units have been grouped into 10 components. The 10 components, together with the estimated number of hours needed for their attainment by post-secondary students with no previous background, are listed here:

THE MEDIA TECHNOLOGY PROGRAM

| Components | Estimated Hours First Year | Second Year | Total |
|---|---|---|---|
| 1. Media Equipment | 450 | – | 450 |
| 2. Drafting | 110 | – | 110 |
| 3. Printing | 45 | 70 | 115 |
| 4. *Software Production | 180 | 285 | 465 |
| 5. Circulation | 20 | – | 20 |
| 6. Commercial Art | – | 270 | 270 |
| 7. Typing | – | 20 | 20 |
| 8. Planning and Presentation | – | 60 | 60 |
| 9. Management | – | 60 | 60 |
| 10. Prescriptive | 20 | 60 | 80 |
| | 825 | 825 | 1650 |

The nature of the program suggests that it can be implemented with reasonable ease in vocational-technical schools, since they are at least partially equipped and staffed to offer this program on an interdepartmental basis. Most already have the staff and the shops for teaching drafting, printing, electronics, and commercial art. Many have audio-visual departments with equipment and know-how and some expertise in software production.

Where an area is not provided for within a school, an arrangement might be made with another vocational school that is not too distant. In other such cases, as, for example, in photography, it may be possible to work out cooperative arrangements with industry. In any case, a vocational-technical school should be able to add this program with a minimum of extra expense.

Should it be desired to teach this program on the secondary-school level, the subject matter, criteria for its attainment, and suggested activities should remain the same. The multi-media technician, however, certainly needs competence in English, basic mathematics, elementary science, and social studies. This program, then, should either be continued into a fifth year of secondary schooling, or else some of the components would have to be eliminated.

*I.e., production of the actual materials required for the various types of audiovisual presentations, e.g., films, slides, recordings, projectuals, TV tapes, etc.

## Levels of Service the Program Can Offer

The principal objective of the program is to train technicians who will assist in planning, designing, producing, and using media and multi-media materials advantageously. It is assumed all students enrolled in the program will be given the opportunity to attain the maximum level of competency as a multi-media technician.

The multi-media technician will be able to perform both creative and technical tasks in planning, designing, producing, and presenting many types of materials. His/her competencies will include both visual and audiovisual presentations. He/she will be able to operate still, motion-picture, and television cameras, and will have expertise in dark-room work, audio and audiovisual techniques, and transparency production. This person will have developed skills in basic drafting, layout, lettering, type selection, technical illustration, and sketching. His/her expertise in printing will include spirit and mimeograph duplication, small-offset-press operation, and photocopying with the graphics camera.

Students will approach and attain the multi-media-technician level of competency at the conclusion of the entire program. They need not, however, pursue the entire program to reach a level of potential employability. Inherent within the program's structure is the attainment of the media-equipment technician level of competency *by the end of the first year.*

The media-equipment technician will be able to operate, service, and perform minor repairs on the major types of equipment in a well-stocked media-production center. He/she will be able to operate and maintain still, motion-picture, and television equipment used in software production. The above areas of expertise will be reinforced with basic skills in dark-room work and printed-material duplication. The equipment technician will have some skill in drafting, and an ability to effectively schedule, monitor, and control the use of hardware and software for media production and use.

It is hoped that, having completed the first year's program and gained some insight into the possibilities in the field, the student will elect to complete the full two-year program and qualify as a multi-media technician.

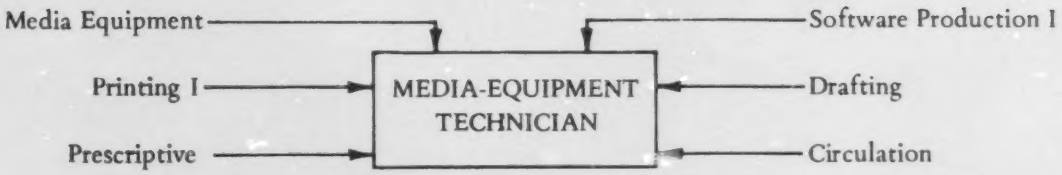
### Media-Equipment Technician

Can perform:

a. All tasks needed to operate media hardware and software, including minor repairs, servicing, cataloging, housing, and circulation.

b. Production tasks requiring basic skills in drafting, printing, still-camera work, dark-room work, motion-picture work, television production, transparency production, sound-systems layout, and audio recording and editing.

Contributing Components



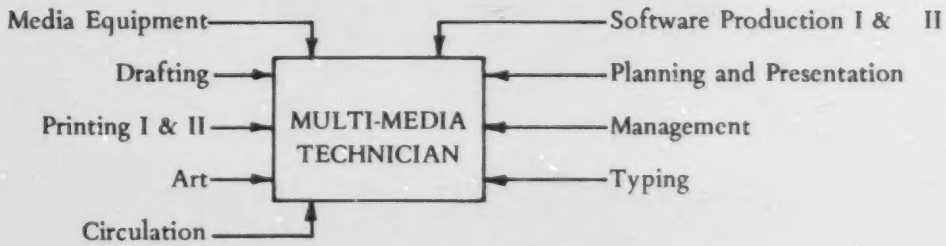

Estimated time to attain this level – one school year.

The school year consists of 165 days with five hours of concentrated instruction and hands-on learning experiences each day.

## Multi-Media Technician

1. Can perform
   a. Production tasks requiring intermediate skills in the production of single- and multi-media software materials of a printed and non-printed nature.
   b. As a media-equipment technician.
2. Can assist others in:
   a. Preparing budgets and equipment requests for the media facility.
   b. Planning, designing, and laying out media and multi-media presentations for specific purposes.

Contributing Components




Estimated time to attain this level – two school years.

## Rationale of the Program

The task force that developed this program regards *student choice* to be the determining factor for admission and *student employability* as the determining factor for success.

The task-force members have built a program of studies that is performance-oriented, competency-based, and interdisciplinary in nature.

Performance-oriented, competency-based programs of study lend themselves to individualized instruction. Since post-secondary students vary so much in attitudes and abilities, and since media technology is in its embryonic stages, it is perhaps overoptimistic to assume that all students will master the entire program by the end of the second year.

Students seeking enrollment will have a variety of abilities and backgrounds. Some may already have developed some defined competency levels prior to enrollment; most will not. Program design includes only one prerequisite – student interest. It is believed this program will accommodate students with extensive as well as limited backgrounds.

Once students begin the pursuit of a given unit, their individual progress should be monitored by instructional and guidance personnel. Should student interest begin to waver, students should be allowed opportunities to pursue units of comparable difficulty. Whenever innate abilities limit student attainment, attempts should be made to prescribe specific routes to competency levels that are realistic for the particular individual. It is conceivable that media-equipment technicians will be needed as much as multi-media technicians.

The essential objective of this program in media technology is *demonstrated competencies that meet performance levels* rather than the amount of time spent in their pursuit.

## The Components Defined

The essentials of each component are listed and defined in their approximate order of arrangement within the program.

A detailed description of each unit of instruction, complete with specific objectives, basic content, and suggested learning activities, comprises the major portion of this course of study, and begins on page 17.

### 1 – The Media Equipment Component
### (First Year – 450 hours)

The media-equipment component will develop the knowledge and abilities needed to operate, service, and make simple repairs on electronic equipment (hardware) for a multi-media facility. This component consists of selected units of instruction listed as follows:

| | |
|---|---|
| Unit I | Motion Picture Film and Sound Projectors |
| Unit II | Slide Projectors |
| Unit III | Filmstrip Projectors |
| Unit IV | Basic Electrical Theory and Practice |
| Unit V | Basic Electronic Theory and Practice |
| Unit VI | Public Address Amplifiers and Systems |
| Unit VII | Reel-to-Reel Type Audio Tape Recorders, Monophonic, Stereo, and Four-Channel |
| Unit VIII | Black and White Video Cameras |
| Unit IX | Black and White Television Receivers and Monitors |
| Unit X | Black and White Videotape Recorders |
| Unit XI | Color Video Cameras |
| Unit XII | Color Television Receivers and Monitors |
| Unit XIII | TV Studio Equipment and Operations |
| Unit XIV | Television Film Projectors |
| Unit XV | Closed-Circuit Television Systems |
| Unit XVI | Color Videotape Recorders |
| Unit XVII | Television Projectors |

### 2 – The Drafting Component
### (First Year – 110 hours)

The drafting component will develop student abilities in tool usage, freehand lettering, dimensioning, construction of geometric shapes, and technical illustration. Students will be exposed to various styles of lettering and lettering techniques. Skill in developing charts and graphs from given data will also be developed. These experiences have been grouped into four units of instruction, as follows:

| | |
|---|---|
| Unit I | Basic Drafting |
| Unit II | Lettering and Types |
| Unit III | Charts and Graphs |
| Unit IV | Technical Illustration |

### 3 – The Printing Component

The purpose of the printing component is to develop those skills essential to the operation of equipment typically found in an in-house quick-copy center. Learning experiences within this component are intended to provide skill in the various processes of large-and small-scale production of printed matter. This component has been divided into two parts. Units of instruction that constitute each part are as follows:

Printing I (First year – 45 hours)

| | |
|---|---|
| Unit I | Spirit Duplication |
| Unit II | Mimeograph Duplication |
| Unit III | Finishing and Bindery Work |
| Unit IV | Offset Duplication |

Printing II (Second year – 70 hours)

| | |
|---|---|
| Unit V | Photocopy |

### 4 – The Software-Production Component

The software-production component is intended to develop student skills and insights in producing effective media materials. Students will have learning experiences in still camera, darkroom, and motion picture work. Abilities in television production, transparency production, sound and sound systems, and audio recording and editing will also be developed.

The production components are offered in two phases. Phase I will develop elementary skills and abilities in the various media, and Phase II will enable students to advance into intermediate levels of knowledge and skills. The units included are as follows:

Software Production I (First Year – 180 hours)

| | |
|---|---|
| Unit I | Still-Camera Work I |
| Unit II | Darkroom Work I |
| Unit III | Motion Picture Work I |
| Unit IV | Transparency Production I |
| Unit V | Sound Reinforcement and Public-Address Techniques |
| Unit VI | Television Production I |
| Unit VII | Audio Recording, Editing, and Synchronizing I |

Software Production II (Second Year – 285 hours)

| | |
|---|---|
| Unit VIII | Still Camera Work II |
| Unit IX | Darkroom Work II |
| Unit X | Motion Picture Work II |
| Unit XI | Transparency Production II |
| Unit XII | Television Production II |
| Unit XIII | The Physical Nature of Sound and Its Reproduction |
| Unit XIV | Audio Recording and Editing II |
| Unit XV | The Production of Audio Materials for Instruction |

### 5 – The Circulation Component
### (First Year – 20 hours)

The circulation component attempts to develop the knowledge and abilities needed to effectively document, maintain, and circulate media software and hardware needed for instructional purposes. There are two units of instruction:

| | |
|---|---|
| Unit I | Organizing Materials and Equipment |
| Unit II | Circulating Materials and Equipment |

### 6 – The Commercial Art Component
### (Second Year – 270 hours)

The art component will develop insights and skills within the areas of color applications, visual-display techniques, and basic sketching. Students will study the psychology of color and selected commercial-art techniques which can be applied to effective software production. Learning experiences in cartooning and figure sketching will also be provided. Skills previously developed within the drafting component will be linked to the art component in pursuit of learning experiences in technical illustration. The art component consists of the following units:

| | |
|---|---|
| Unit I | Introduction to Commercial Art |
| Unit II | Tools and Materials |
| Unit III | Color |
| Unit IV | Layout and Design |
| Unit V | Basic Drawing |
| Unit VI | Visual Display |

### 7 – The Typing Component
### (Second Year – 20 hours)

The purpose of the typing component is to develop typing skills needed to support the role of the multi-media technician. Students will be able to type required copy that is appropriately centered and spaced, using a variety of fonts. Students will also learn to select a type font appropriate to a given effect. Attention will also be given to the mechanics of page centering and copy layout for special effects. There is only one unit of instruction, defined as Media Typing.

### 8 – The Planning and Presentation Component
### (Second Year – 60 hours)

The planning and presentation component attempts to develop those insights and abilities needed to effectively plan and present single- or multi-media programs of an educational and/or informative nature. Students will be required to plan, story-board, script, produce, and exhibit selected presentations in a variety of media forms. Students will select specific media for desired objectives. The characteristics of effective vs. ineffective presentations will be examined. Units of instruction that constitute this component are as follows:

| | |
|---|---|
| Unit I | Principles of Effective Media |
| Unit II | Projection Techniques and Environment |
| Unit III | Planning and Executing Media Presentations |

**9 – The Management Component**
**(Second Year – 60 hours)**

The purpose of the management component is to expose students to the fiscal and human essentials of effective management techniques.

While it is assumed that graduates of this program will perform nonmanagerial roles within media technology, it is important that they know the approximate costs of using the various media and have some insight into interstaff relationships and organizational structures as they apply to schools, industry, and government. They should be aware of the employment possibilities in the field, the duties of media technicians, and the qualities that make an employee successful. They should appreciate the factors that make for an efficient shop as well. The units of instruction designed to carry out these objectives are:

| | |
|---|---|
| Unit I | The Role of the Media Technician |
| Unit II | Human Relations on the Job |
| Unit III | The Efficient Media Center |
| Unit IV | Costs and Budgets |

**10 – The Prescriptive Component**
**(First Year – 20 hours,**
**Second Year – 60 hours)**

The prescriptive component is a program individualized for each student. The purpose is to give students opportunities to develop specific competencies of their own choice under direction and supervision. To accomplish this, adequate guidance must be available to each student.

Students could be given time to review units of instruction they may not have mastered. Accelerated students could be directed toward learning experiences that would increase their competency levels in selected areas. Students with learning problems can concentrate on particular components and units, and thus attain employability within a specific phase of media technology. It is believed that effective implementation of this component will be of maximum benefit for all students.

## The Cooperative Education Aspect

A school that adopts this program is strongly urged to develop cooperative arrangements with industry to supplement the coursework. Cooperative experiences are especially desirable in the following situations:

1. *Where a school lacks facilities and/or up-to-date equipment and/or staff for a particular component of the program.* Then the industry becomes a substitute for the classroom and shop. In such a case, some instructor – either a person from industry or a teacher with a related competency – must be available to integrate the students' work experiences into more generalized learning experiences, based upon the outline in this course of study. Students' work assignments should be rotated, and class discussions held so that all can profit from each other's experiences.

2. *Where a particular student has already achieved a high level of skill in a particular area upon entering the program.* This skill can then be applied immediately in a job situation, rather than having the student waste time "learning" what he/she already knows.

3. *Where it is desired to augment or enrich classroom instruction in a particular component.*

4. *Where a student has covered the coursework so well that there is little need for the prescriptive component of the course.* He/she can substitute on-the-job experience.

Assigned effectively, students could perform actual production work within industry under conditions of deadlines. Actual production techniques could be learned on the job. The need for effective consumer-client relationships will be appreciated in a real work situation.

Cooperative arrangements can be utilized to stress specific components or parts of components. For example, a talented student could be assigned to a practicing commercial artist to do artwork intended for real production. Students could also be exposed to new processes and items of equipment in actual production facilities.

This program will provide a realistic assessment of a student's ability to perform effectively outside the educational environment. In addition, the degree of success would help determine the program's strengths and needs.

In brief, this aspect of the program should be considered a flexible tool to be used at any time during a student's career when he/she could profit more from it than from formal study within the school. Like other cooperative programs, it can be of mutual benefit to student, school, and employer. In many instances it will open job opportunities to students upon completion of the course.

## STUDENT PROGRESS CHART

Owing to the interdisciplinary nature of the program and the two levels of attainment it provides, appropriate record-keeping on student achievements and competencies is essential. A student progress chart, reflecting the program's scope and levels of employability, has therefore been developed.

Essential to the effectiveness of this chart is the accuracy of the instructor's judgments of the student's ability to:

1. Meet the performance demands.
2. Measure up to the specific objectives that precede each unit of instruction.

Performance demands have been summarized in "Levels of Service the Program Can Offer" (pages 3 – 4 ). The specific objectives are included in the detailed outline of each component, beginning on page 17 of this manual.

The advantages of maintaining a chart such as this are several. Primarily it summarizes each student's attainments for the two levels of achievement. Rather than give a grade for each unit, the instructor should withhold his/her signature until he/she feels that the student could perform the particular work competently on a job.

Secondly, the instrument can provide an accurate educational and performance profile for each student as he/she pursues the program. This feature should prove useful to instructors, guidance personnel, and supervisors in guiding students toward educational and competency levels that are consistent with their abilities and realistic aspirations.

Utilized as a transcript, the chart can provide potential employers with an accurate profile of the individual's background and achievements.

(School Name)

Student's Name _____

Course I

Multi-Media Technician – First Year
Media Equipment Technician – Complete Course

| | Date Attained | Instructor's Signature |
|---|---|---|
| **MEDIA EQUIPMENT** | | |
| 1. Motion Picture Film and Sound Projectors | | |
| 2. Slide Projectors | | |
| 3. Filmstrip Projectors | | |
| 4. Basic Electrical Theory and Practice | | |
| 5. Basic Electronic Theory and Practice | | |
| 6. Public Address Amplifiers and Systems | | |
| 7. Reel-to-Reel Type Audio Tape Recorders, Monophonic, Stereo, and Four-Channel | | |
| 8. Black and White Video Cameras | | |
| 9. Black and White Television Receivers and Monitors | | |
| 10. Black and White Videotape Recorders | | |
| 11. Color Video Cameras | | |
| 12. Color Television Receivers and Monitors | | |
| 13. TV Studio Equipment and Operations | | |
| 14. Television Film Projectors | | |
| 15. Closed-Circuit Television Systems | | |
| 16. Color Videotape Recorders | | |
| 17. Television Projectors | | |
| **DRAFTING** | | |
| 1. Basic Drafting | | |
| 2. Lettering and Types | | |
| 3. Charts and Graphs | | |
| 4. Technical Illustration | | |
| **PRINTING I** | | |
| 1. Spirit Duplication | | |
| 2. Mimeograph Duplication | | |
| 3. Finishing and Bindery Work | | |
| 4. Offset Duplication | | |
| **SOFTWARE PRODUCTION I** | | |
| 1. Still Camera Work I | | |
| 2. Darkroom Work I | | |
| 3. Motion Picture Work I | | |
| 4. Transparency Production I | | |
| 5. Sound Reinforcement and Public Address Techniques | | |
| 6. Television Production I | | |
| 7. Audio Recording, Editing, and Synchronizing I | | |
| **CIRCULATION** | | |
| 1. Organizing Materials and Equipment | | |
| 2. Circulating Materials and Equipment | | |

(School Name)

Student's Name _____

Course II

Multi-Media Technician – Second Year

| | Date Attained | Instructor's Signature |
|---|---|---|
| **SOFTWARE PRODUCTION II** | | |
| 8. Still Camera Work II | _____ | _____ |
| 9. Darkroom Work II | _____ | _____ |
| 10. Motion Picture Work II | _____ | _____ |
| 11. Transparency Production II | _____ | _____ |
| 12. Television Production II | _____ | _____ |
| 13. Physical Nature of Sound and Its Reproduction | _____ | _____ |
| 14. Audio Recording and Editing II | _____ | _____ |
| 15. Production of Audio Materials for Instruction | _____ | _____ |
| **COMMERCIAL ART** | | |
| 1. Introduction to Commercial Art | _____ | _____ |
| 2. Tools and Materials | _____ | _____ |
| 3. Color | _____ | _____ |
| 4. Layout | _____ | _____ |
| 5. Basic Drawing | _____ | _____ |
| 6. Visual Display | _____ | _____ |
| **PRINTING II – Photocopy** | _____ | _____ |
| **TYPING FOR MEDIA** | _____ | _____ |
| **PLANNING AND PRESENTATION** | | |
| 1. Principles of Effective Media | _____ | _____ |
| 2. Projection Techniques and Environment | _____ | _____ |
| 3. Planning and Executing Media Presentations | _____ | _____ |
| **MANAGEMENT** | | |
| 1. The Role of the Media Technician | _____ | _____ |
| 2. Human Relations on the Job | _____ | _____ |
| 3. The Efficient Media Center | _____ | _____ |
| 4. Costs and Budgets | _____ | _____ |

## PROPOSED SCHEDULING PLAN FOR THE PROGRAM

Program scheduling is intended to meet the following criteria:

1. Students would be exposed to the essentials of media technology at the outset.
2. Students will pursue a full-time program for a post-secondary school day of 5 hours.
3. The program should not exceed 2 years in duration.
4. Students would attain at least a basic level of employability by the end of the first year.

The components have been arranged according to both their degree of difficulty and their specific contribution to performance demands and levels of employability. The components suggested for the second year's work assume completion of the entire first year's work.

Sessions last 165 days per year, and the school day is divided into a morning session of 3 hours and a 2-hour afternoon session. The scheduled arrangement of components for both years of the program is listed below.

Year I – Media-Equipment Technician Level

Total days: 165 – 5 hours instruction per day

| A.m. session – 3 hours | P.m. session – 2 hours |
|---|---|
| Morning hours – 495 | Afternoon hours – 330 |
| 450 Media Equipment | 110 Drafting |
| 45 Printing I | 180 Software Prod. I |
| 495 | 20 Circulation |
| | 20 Prescriptive |
| | 330 |

Year II – Multi-Media Technician Level

Total days: 165 – 5 hours of instruction per day

| A.m. session – 3 hours | P.m. session – 2 hours |
|---|---|
| Morning hours – 495 | Afternoon hours – 330 |
| 285 Software Prod. II | 270 Art |
| 70 Printing II | 60 Management |
| 20 Typing | 330 |
| 60 Planning-Presentation | |
| 60 Prescriptive | |
| 495 | |

Since most of the coursework is of a laboratory nature, it is suggested that courses be followed for the most part in the order indicated, with full 3-hour morning and 2-hour afternoon sessions devoted to single components.

If scheduling difficulties arise due to lack of room in certain shops, then it may be necessary to split the class into groups and fit small groups of students into those shops as vacant stations permit. In such cases, the course schedule as suggested here will necessarily need to be altered.

Those components that lend themselves to skill development without specialized and/or expensive equipment, particularly Drafting and Art, have been allocated less time than they actually require for the student to gain proficiency. It is assumed that in these areas, the school-time learning activities will be augmented by selected activities pursued on the student's own time at limited expense.

Some overlapping of subject matter among the different components is inevitable and, indeed, desirable – both for review purposes and to present similar material from slightly different points of view. For example, there is some overlapping between the Media-Equipment and Software-Production components; between Drafting and Art; between Printing and Art; between Circulation and Management. The Planning and Production component, of course, leans heavily on all the other components.

*If this course is to succeed, it is important that the individual teachers involved confer with each other, both as a group and in pairs when necessary, to learn what each has taught or is expecting to teach.* An art teacher, for example, who when starting to teach layout, expects the students to have a knowledge of the use of transfer types in lettering, will be disagreeably surprised if he/she learns that the drafting teacher has omitted this through lack of time.

The Software-Production instructor and the Media-Equipment instructor need to have full knowledge as well of the equipment available for use in both areas. And of course all instructors should be fully aware of the capabilities of the school printshop's graphics equipment.

## YEAR I

While concentrating on the Media-Equipment component, a "hands-on" course including operation, maintenance, and minor repairs of equipment, the student will pursue the Drafting component. The drafting units develop skills in design, lettering, and preparation of charts and graphs and technical illustrations intended for production. The above arrangement exposes students to the essential mechanical, technical, and drafting skills that are needed for media software production.

Software Production I should follow student attainment of the Drafting component. This arrangement would utilize skills previously acquired as the student develops an ability to produce media software. Once the Media-Equipment component is attained, the Printing I component should follow, thus rounding out the student's basic abilities to utilize media equipment. Pursuit and attainment of the Circulation and

Prescriptive Components would complete the first year of the program, enabling the student to offer numerous skills in multi-media-equipment operation to a school or institution.

It is believed the above program will develop students to the media-equipment-technician level of performance and employability. They could also perform useful services in developing media materials within government agencies, educational and other institutions, and private industry.

It is hoped, however, that students will at this point be aware of their potential employability in an expanding field and will elect to seek continued growth and greater employment potential by devoting a second year to the program.

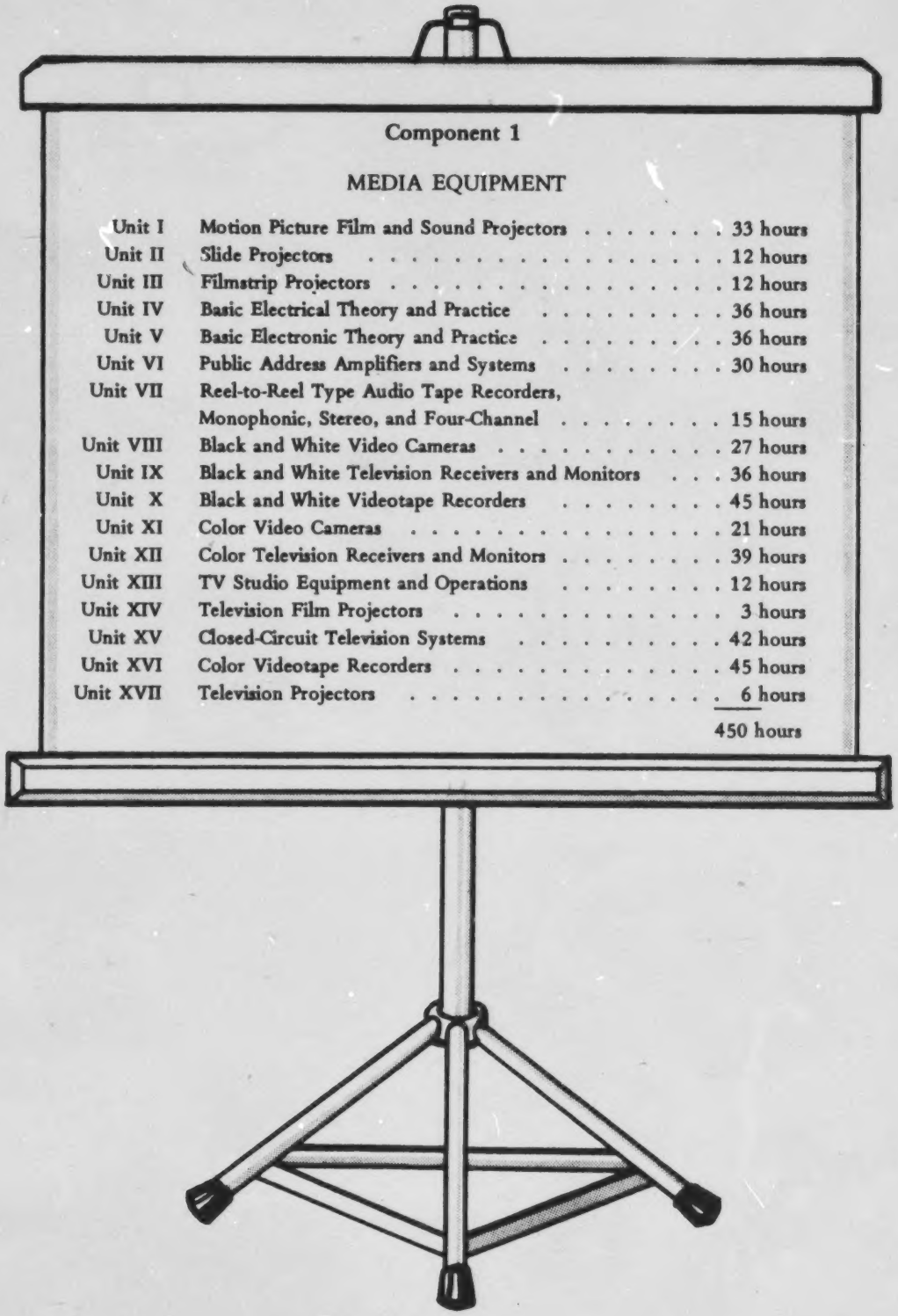
## YEAR II

Acquired skills in software production would be reinforced and heightened to intermediate levels of competency with pursuit of Software Production II. The accompanying Art component would develop practical and aesthetic abilities to produce media materials for specific presentations. Pursuit of the Printing II (photocopy) and Typing components would round out student abilities to meet the performance demands specified for the multi-media-technician level of competency and employability.

Insights into the essentials of planning educational media materials, as well as continued refinement of production techniques, would be gained by student pursuit of the Planning and Presentation component. The Management component would complete the scheduled program and still allow time for the implementation of the Prescriptive component. The potentials of this component were briefly described on page 9.

As suggested previously, a cooperative-education experience could be substituted for the Prescriptive component or for some area where the student had already developed the required skills.

Needless to say, the details of either a Prescriptive component or a cooperative-education experience should be specifically designed for each particular student, to remedy weaknesses, further develop strengths, and/or give the student worthwhile on-the-job experiences.



## Component 1

### MEDIA EQUIPMENT

| | | |
|---|---|---|
| Unit I | Motion Picture Film and Sound Projectors | 33 hours |
| Unit II | Slide Projectors | 12 hours |
| Unit III | Filmstrip Projectors | 12 hours |
| Unit IV | Basic Electrical Theory and Practice | 36 hours |
| Unit V | Basic Electronic Theory and Practice | 36 hours |
| Unit VI | Public Address Amplifiers and Systems | 30 hours |
| Unit VII | Reel-to-Reel Type Audio Tape Recorders, Monophonic, Stereo, and Four-Channel | 15 hours |
| Unit VIII | Black and White Video Cameras | 27 hours |
| Unit IX | Black and White Television Receivers and Monitors | 36 hours |
| Unit X | Black and White Videotape Recorders | 45 hours |
| Unit XI | Color Video Cameras | 21 hours |
| Unit XII | Color Television Receivers and Monitors | 39 hours |
| Unit XIII | TV Studio Equipment and Operations | 12 hours |
| Unit XIV | Television Film Projectors | 3 hours |
| Unit XV | Closed-Circuit Television Systems | 42 hours |
| Unit XVI | Color Videotape Recorders | 45 hours |
| Unit XVII | Television Projectors | 6 hours |
| | | 450 hours |

## Component 1 – Media Equipment

### Unit I – Motion Picture Film and Sound Projectors

(33 hours)

**Specific Objectives**

The student will demonstrate an understanding of and ability to use 16mm sound projectors as follows:

1. Set up a 16mm projector for proper operation and operate it.
2. Perform routine tasks essential to effective equipment maintenance.
3. Perform pre-determined field repairs as listed within this unit.
4. Perform needed bench repairs as listed.
5. Trouble-shoot and effectively service 16mm projectors.

**Basic Content**

1. Setting up the projector
2. Projection-lamp replacement
3. Cleaning of projector film track
4. Exciter-lamp replacement
5. Exciter-lamp and photo-tube operation
6. Sound-track alinement
7. Adjusting timing-belt tension
8. Projector speed checks
9. Auto-load system adjustment
10. Adjusting loading guides
11. Loop restorer
12. Timing the sprockets
13. Shuttle-tooth side clearance adjustment
14. Shuttle arm to pull-down cam adjustment
15. Disassembly procedure
16. Cleaning and lubrication
17. Reassembly procedure

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Setting up the projector. | |
| a. Instruct students on auto-load and manual-load projectors – all important parts, jacks, and adjustments. Manufacturers' operation manual should be used for this instruction. | a. Demonstrate threading of manual and auto-load projectors. Function of all visible parts should be defined. |
| | b. Have students thread both types of projectors. |
| b. Instruct students on correct method of shutting down projector and storing. | c. Have students shut down projector and prepare for storage. |

| | |
|---|---|
| 2. Projection-lamp replacement. | |
| Instruct students on correct method of replacing lamp. | a. Demonstrate correct method of lamp replacement.<br><br>b. Have students replace lamps of various projectors. |
| 3. Cleaning of projector film track. | |
| a. Instruct students on cleaning of film path, aperture on pressure plates, lens, and condenser lens. | a. Have students check and clean all necessary surfaces, drums, and guides in film path. |
| b. Caution students on handling of lenses. | b. Remove, clean, and replace optical system. |
| 4. Exciter lamp replacement. | |
| Instruct students on correct method of lamp replacement. Emphasize that lamp should be kept clean. | Have students make exciter lamp replacement. |
| 5. Exciter lamp and photo-tube operations. | |
| Instruct students on operation of exciter lamp and photo-tube. | Demonstrate loss of sound due to defective exciter lamp. |
| 6. Sound-track alinement. | |
| Illustrate buzz-track adjustment, centering the sound-scanning light, focusing the sound optic and adjusting its azimuth position, sound pressure roller, assembly adjustment. Explain that in normal operation, unless tampered with, this adjustment will not be necessary. | Demonstrate the complete adjustment of sound track. Throw sound track out of alinement. Have students make all necessary adjustments according to the manufacturer's instructions. |
| 7. Adjusting timing belt tension. | |
| a. Illustrate removal and replacement of timing belt. | Have students remove, install, and make necessary adjustments to timing belts. |
| b. Emphasize correct adjustment to provide longer belt life. | |
| 8. Projector speed checks. | |
| Illustrate several methods of checking projector speed, such as stroboscope, tachometer, or strobe disk. | Have students check projector speed, using several methods. |

| | |
|---|---|
| 9. Auto-load system adjustments. | |
| Instruct and illustrate the auto-load system in general. | Demonstrate operation of auto-load system. |
| 10. Adjusting loading guides. | |
| Instruct and illustrate complete adjustment of loading guides. The manufacturer's instructions should be followed. | Have students perform complex adjustments on loading guides. |
| 11. Loop restorer. | |
| a. Illustrate checking and adjustment of loop restorer. | Have students adjust loop restorer for correct restoration of film loop. |
| b. Emphasize need for this adjustment. | |
| 12. Timing the sprockets. | |
| a. Illustrate how to check and adjust timing of the sprockets. | a. Demonstrate the correct method of adjusting the sprockets. |
| | b. Have students check and adjust the sprockets' timing. |
| 13. Shuttle-tooth side clearance and height adjustment. | |
| Illustrate the checking and adjustment of the shuttle tooth and pull-down cam. | a. Demonstrate the correct adjustment of the shuttle tooth for side clearance and height. |
| | b. Have students adjust shuttle tooth and pull-down cam. |
| 14. Shuttle arm to pull-down cam adjustment. | |
| Illustrate and instruct on shuttle-arm and pull-down-arm fit. | a. Demonstrate the correct procedure to adjust the cam to the shuttle arm. |
| | b. Have students make cam adjustment. |
| 15. Disassembly procedure. | |
| Instruct on and demonstrate the disassembly of projector. For this procedure refer to manufacturer's instructions. | Have students disassemble projector. |

16. Cleaning and lubrication.

| | |
|---|---|
| Instruct on and demonstrate cleaning procedure. Instruct and demonstrate the correct procedure in lubricating bearings, shafts, and surfaces with the proper lubricant and correct amount. | a. Have students clean all necessary areas.<br><br>b. Have students lubricate all bearings, shafts, and surfaces that require lubrication. |

17. Reassembly procedure.

| | |
|---|---|
| a. Instruct on and demonstrate correct procedure for reassembly of the projector, and testing for proper operation. | Have students reassemble and test for proper operation of the projector. |

**Equipment Needed**

Bell and Howell Filmosound Projector, Model 552EXT
Bell and Howell Model 1552
Kodak Ektagraphic Movie Projector, Model 120
VTVM
Order all special tools, gages, cleaners, and lubricants from manufacturer.
Handtools.

**Facilities Needed**

For the Equipment Component of this course, a shop area with workbenches is required, as well as the facilities of a classroom with chalkboard and instructor's desk. An adequate area for storing equipment is necessary. For some units a studio will be needed, and for some, isolated electrical supplies.

## Unit II – Slide Projectors

(12 hours)

**Specific Objectives**

The student will display abilities to effectively set up, operate, service, and maintain slide projectors, as follows:

1. Perform all steps and tasks essential to slide-projector setup.
2. Perform all tasks necessary for routine slide-projector maintenance.
3. Trouble-shoot the Carousel slide projector with remote-control head.

**Basic Content**

1. Setting up the slide projector
2. Projection-lamp replacement
3. Cleaning the optical system
4. Remote control
5. Use of volt-ohmmeter
6. What to do if projector will not turn on
7. What to do if remote control will not function
8. Projector-housing disassembly procedure

**Suggested Learning Activities**

| | Classroom | Laboratory |
|---|---|---|
| 1. | Setting up the projector. | |
| | a. Instruct students on slide-tray loading and mounting on projector. | a. Demonstrate setting up and adjusting projector. |
| | b. Remove slide tray, show single slides and all jacks and adjustments. | b. Have students set up projector and make all necessary adjustments. |
| 2. | Projection-lamp replacement. | |
| | Instruct students on the correct method of lamp replacement. | a. Demonstrate lamp replacement. |
| | | b. Have students replace projection lamp on several models of projectors. |
| 3. | Cleaning the optical system. | |
| | a. Instruct students on the cleaning of the optical system. | a. Demonstrate cleaning of optical system. |
| | b. Caution students on handling of lenses. | b. Have students clean optical system. |

4. Remote control

| | |
|---|---|
| Instruct students on the function of the remote-control head. | Disassemble the remote-control head. Demonstrate the function of contacts for focus and forward and reverse actions. Instruct students on method of cleaning contacts when necessary. |

5. Instruct students on operation of volt-ohmmeter and demonstrate its use.

6. Projector will not turn on.

| | |
|---|---|
| Instruct students on how to test the following trouble areas: receptacle, with voltmeter or lamp; line cord with ohmmeter; fuse or thermal fuse with ohmmeter; switch with ohmmeter. | With volt-ohmmeter, have students test AC receptacle for correct voltage; test line cord, fuses, thermal fuses, and off-and-on switch for continuity. |

7. Remote control will not function.

| | |
|---|---|
| Instruct students on how to test remote-control cable with ohmmeter. | Have students connect ohmmeter to remote-cable jack to test continuity of cable. |

8. Projector-housing disassembly procedure.

| | |
|---|---|
| a. Instruct students on housing disassembly of slide projector for inspection of loose or broken parts and belt drives. | a. Have students disassemble and reassemble various slide projectors and acquaint them with the complex mechanisms. |
| b. Instruct students on correct method of lubrication. | b. Have students lubricate the slide projector. |
| c. Emphasize to students that at no time should any unit be disassembled unless they are knowledgeable in this area. | |

**Equipment Needed**

Kodak Model 760H Carousel projector
Kodak Model 800H Carousel projector
Assortment of slides
Hand tools

(The number of projectors and VOM's will depend on student load.)

## Unit III – Filmstrip Projectors

(12 hours)

**Specific Objectives**

The student will display abilities to effectively operate, service, and maintain filmstrip projectors as follows:

1. Set up and operate a filmstrip projector.

2. Maintain and service various types of projectors as described within this unit.

   a. Filmstrip projectors with phonograph-type audio systems
   b. Filmstrip projectors with cassette-type audio
   c. Super-8mm film-loop players

**Basic Content**

1. Setting up the projector
2. Projection-lamp replacement
3. Cleaning the projector
4. Disassembly and reassembly of projector
5. Audio systems
6. Super-8mm film-loop player
7. Filmstrip projector with cassette-type audio
8. Cleaning and lubricating the film

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Setting up the projector. | |
| a. Demonstrate loading the projector, removal and rewinding of film. | Have students set up and operate various types of projectors with and without audible cue. |
| b. Instruct on controls, jacks, remote control, and audio (record and cassette types). | |
| 2. Projection-lamp replacement. | |
| Demonstrate the removal and installation of projection lamps. Care in handling of lamps should be emphasized. | Have students remove and replace projection lamps. |

| | |
|---|---|
| 3. Cleaning the projector. | |
| a. Demonstrate cleaning the optical system. | a. Have students remove and clean optical system. |
| b. Caution students on handling of lenses. | b. Have students remove necessary parts to clean film guides and carrier. |
| c. Demonstrate cleaning of film track. | |
| 4. Disassembly and reassembly of projector. | |
| a. Demonstrate disassembly and reassembly of projector. Emphasize belt and drive replacement. | Have students disassemble and reassemble various types of film-strip projectors, remove and reinstall drives and belts. |
| b. Instruct on the mechanical operation of the projector. | |
| 5. Audio systems. | |
| a. Instruct on record-type audio pick-up and audio amplifier operation. | a. Have students check drive and idler wheels – remove, clean, and relubricate. |
| b. Instruct on cassette-type playback and audio amplifier operation. | b. Have students check, clean, and demagnetize playback head. |
| 6. Super-8mm film-loop player. | |
| a. Demonstrate loading of the projector. | Have students set up and operate projectors, clean film gate and optical system, replace projection lamp, etc. |
| b. Instruct on controls and adjustments. | |
| c. Instruct on cleaning and maintenance. | |
| 7. Cleaning and lubricating film. | |
| Instruct on and demonstrate cleaning and lubricating the film. | Have students clean and lubricate film. |

Where Super-Eight and 35mm projectors are available, follow the same procedures. Also, manual-threading projectors.

**Equipment Needed**

DuKane Micromatic Sound Filmstrip Projector, Models 14A650 and 14A653
Viewlex Model V-135 and V-136
Technicolor Loop Player Model 520 V017
Hand tools

## Unit IV – Basic Electrical Theory and Practice

(36 hours)

**Specific Objectives**

The student will display an understanding of D.C. and A.C. theory and practice as follows:

1. State the properties of direct current and voltage.
2. Define the principle of resistance and explain its effect on current and voltage.
3. Perform soldering practices as required.
4. State the properties of alternating current and voltage.
5. State the properties of magnetism.
6. Define and differentiate between the properties of inductance and capacitance separately and when combined with resistance.
7. Explain fully the power requirements of electrical equipment.
8. Take proper safety precautions in using all equipment.

**Basic Content**

1. Basic physics of matter
2. Direct voltage
3. Direct current
4. Resistance
5. Conductors and insulators
6. Ohm's law
7. Soldering techniques
8. Alternating voltage
9. Alternating current
10. Permanent magnets
11. Electromagnetism
12. Inductance
13. Capacitance
14. L.C.R. circuits
15. Power requirements

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Basic physics of matter | (Introductory lecture – no laboratory) |

| | |
|---|---|
| 2. Direct voltage | |
| a. Illustrate sources of voltage and demonstrate the presence of voltage in a battery. | a. Demonstrate the VOM as an instrument to measure voltage. |
| b. Emphasize safety. | b. Have students measure voltage of power supply, batteries, line. |
| 3. Direct current | |
| a. Illustrate current-flow in reference to voltage. | a. Demonstrate the VOM as an instrument to measure current. |
| b. Emphasize safety. | b. Have students measure current-flow from low-voltage power supply at various voltages and loads. |
| 4. Resistance | |
| a. Color code | a. Demonstrate the VOM as an instrument to measure resistance. |
| b. Illustrate types and physical sizes of resistors in comparison to wattage. | b. Have students measure resistance of various resistors. |
| c. Illustrate types of tapped and variable resistors. | |
| 5. Conductors and insulators | |
| a. Illustrate various types of conductors and sizes. | a. Demonstrate sizes and insulation of conductors. |
| b. Illustrate the current-carrying capabilities of various sizes of wire. | b. Demonstrate the breakdown of the wire under excessive current conditions. |
| c. Illustrate the breakdown potential of insulation. | c. Have students identify sizes of conductors. |
| 6. Ohm's law | |
| a. Illustrate series- and parallel-resistive circuits, voltage drops, and current flow. | a. Demonstrate series- and parallel-resistive circuits, the measurement of voltage drops and current flow. |
| b. Illustrate the dissipation of power across resistive components. | b. Have students measure and explain voltage drops. |
| | c. Have students take current-flow and resistive measurements. |

| | |
|---|---|
| 7. Soldering techniques | |
| a. Demonstrate wires, components, terminals, printed-circuit components and boards, types of connectors and cables. | a. Demonstrate soldering of wires to terminals, printed boards, connectors. |
| b. Discuss types of solder, solder guns, and irons. | b. Demonstrate poor solder joints and their effect on electrical circuits. |
| c. Instruct students on soldering techniques. | c. Have students solder wires to terminals and printed boards. |
| | d. Have students make up connectors and cables. |
| 8. Alternating voltage | |
| a. Illustrate the sources of alternating voltage. | a. Demonstrate with an oscilloscope the sine wave, sawtooth, square wave, trapazoidal, parabolic, and pulsating DC (half-wave and full wave). |
| b. Illustrate the sine wave and phase relationship of two or more voltages. | b. Have students measure various types of waveforms on the oscilloscope. |
| c. Illustrate addition of two or more alternating voltages (in phase, 180° out of phase, 90° out of phase), addition of alternating voltage to direct voltage. | c. Have students measure alternating voltages (RMS, peak-voltage, peak-to-peak voltage values.) |
| d. Illustrate various types of alternating-voltage waveforms, such as square wave, sawtooth, trapazoidal, parabolic, and pulsating DC. | d. Have students draw diagrams of all voltages to scale. |
| e. Emphasize safety. | |
| 9. Alternating current | |
| a. Illustrate the relationship of current to voltage. | a. Demonstrate the effects of current through a resistive heating element (incandescent bulbs) |
| b. Illustrate the effects of current. | b. Demonstrate the measurement of current and voltage. |
| | c. Have students measure current and voltage and draw the sine wave to scale. |
| 10. Permanent magnets | |
| a. Demonstrate the magnetic fields of various permanent magnets. | |
| b. Illustrate the combining of opposing forces and aiding forces. | |

| | |
|---|---|
| 11. Electromagnetism | |
| Illustrate the development of the electromagnetic field around a conductor and inductor. | Demonstrate the electromagnetic field and its use, with DC and AC voltages. |
| 12. Inductance | |
| a. Illustrate the inductor and the effect of the inductance on alternating current. | a. Demonstrate the effect of inductors on DC and AC currents at various frequencies. |
| b. Illustrate inductive reactance and impedance. | b. Have students identify various types of inductors. |
| c. Illustrate inductors in series and parallel circuits. | c. Have students measure current-flow and voltage-drops across the inductor and resistive network. |
| d. Emphasize safety. | |
| 13. Capacitance | |
| a. Illustrate types of capacitance and the effect of capacitance on direct current and alternating current. | a. Demonstrate the effect of capacitance on DC and AC voltages, at various frequencies. |
| b. Illustrate capacitive reactance and impedance. | b. Have students identify various types of capacitors. |
| c. Illustrate capacitors in series and parallel circuits. | c. Have students measure the charging of an electrolytic capacitor and voltage-drops across the capacitor and resistive network. |
| d. Emphasize safety. | |
| 14. L.C.R. circuits | |
| a. Illustrate the effect of inductors and capacitors on A.C. currents and voltages when inductors and capacitors are combined in series and parallel. | a. Demonstrate the effect of inductors, capacitors, and resistance on current and voltages. |
| | b. Demonstrate resonance. |
| b. Illustrate resonance and its application. | c. Have students measure voltage drops across the resistance, inductance, and the capacitors in an L.C.R. circuit. |
| | d. Have students view the oscillation potential developed in a variable-oscillator tank circuit. |
| 15. Power requirements for lighting and equipment. | |
| a. Illustrate the maximum load that may be placed on a 15-amp and 20-amp receptacle. | Demonstrate the effect of overloading an AC power line and emphasize the damage which could occur to equipment as a result of overloading. |
| b. Emphasize the effect of overload on a power line. | |

**Equipment Needed**

Note: There should be one piece of equipment and one of each of the test boards for every two students.

D.C. power supply
A.C. power supplies
VOM
VTVM
AC ammeters
Single-trace oscilloscope
Assortments of two-watt resistors made up on test boards
Assortments of incandescent lamps made up on test boards
Assortments of inductors and capacitors made up on test boards.
Handtools

## Unit V – Basic Electronic Theory and Practice

(36 hours)

### Specific Objectives

The student will display an understanding of electronic theory and practice as follows:

1. Explain the purposes and uses of the vacuum tube and solid-state devices.
2. Explain the various functions of vacuum tubes and solid-state devices in radio equipment such as amplifiers, oscillators, detectors, converters, and others, as listed within this unit.
3. State the specific power changes that occur when current moves from one solid-state device to another.
4. Perform all tests required to determine the effective operation of each item listed within this unit.

### Basic Content

1. Vacuum tubes
2. Silicon and germanium diodes
3. Transistors
4. Audio amplifiers
5. Detectors AM–FM
6. Clipper
7. IF amplifiers
8. Converters
9. Local oscillator
10. RF amplifier

### Suggested Learning Activities

| | Classroom | Laboratory |
|---|---|---|
| 1. | Vacuum tubes | |
| | a. Illustrate the diode, triode, pentode, beam power, amplifier, pentagrid converter. | a. Demonstrate the action of rectifiers, amplifiers, and oscillators. |
| | b. Illustrate vacuum-tube action. | b. Have students check rectifier action as applied to power supplies and detectors. |
| | c. Illustrate the various types of rectifiers, amplifiers, and oscillators. | c. Have students check the audio amplifier, IF amplifier, and local oscillator action of an AM vacuum-tube receiver. |
| 2. | Silicon and germanium diodes | |
| | a. Illustrate the basic function of the above diodes as power rectifiers and detectors. | a. Demonstrate the action of the power rectifier and AM detector. |

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|---|---|
| b. Illustrate the action of SCR and tunnel diodes | b. Have students test input and output waveforms. |
| 3. Transistors | |
| a. Illustrate physical construction and action of the transistor. | a. Demonstrate the action of transistors as amplifiers. |
| b. Illustrate the transistor as an amplifier. | b. Have students test transistor amplifiers. |
| c. Illustrate the action of the FET and the MOS types of transistors. | c. Have students identify various types of transistors. |
| | d. Demonstrate transistor-type power supplies. |
| 4. Audio amplifiers | |
| a. Illustrate audio-amplifier action (voltage and power amplifiers) | a. Demonstrate audio-amplifier action and frequency compensation. |
| b. Illustrate frequency compensation, impedance matching. | b. Have students test the action of audio amplifiers with and without frequency compensation. |
| 5. Detectors, AM and FM | |
| Illustrate AM and FM detector action. | a. Demonstrate AM and FM detector action. |
| | b. Have students test action of detectors. |
| 6. Clipper | |
| Illustrate the action of the clipper. | a. Demonstrate clipper action. |
| | b. Have students test the input and output waveform of the clipper. |
| 7. IF amplifiers | |
| Illustrate the action of the IF amplifier. | Demonstrate the action of the IF amplifier and IF alinement. |
| 8. Converters | |
| Illustrate the purpose and action of the converter. | a. Demonstrate the action and alinement of the converter. |
| | b. Have students test the action of a converter with RF generator and oscilloscope. |

9. Local oscillator

| | |
|---|---|
| Illustrate the purpose and action of the local oscillator. | a. Demonstrate local-oscillator action.<br><br>b. Have students test the action of the local osc and test frequency with the RF generator and oscilloscope. |

10. RF amplifier

| | |
|---|---|
| Illustrate the purpose and action of the RF amplifier. | a. Demonstrate the action and alinement of the RF amplifier.<br><br>b. Have students test the action of the RF amplifier and aline. |

**Equipment Needed**

Note: There should be one piece of equipment for every two students.

High-voltage power supplies
Superhet radio receivers (vacuum-tube type)
FM radio (vacuum-tube type)
Public-address amplifiers
Audio generators
RF generators
VOM
VTVM
Single-trace oscilloscope
Handtools

## Unit VI – Public-Address Amplifiers and Systems

(30 hours)

**Specific Objectives**

The student will display the ability to set up and maintain effective public address systems, as follows:

1. Identify and define the purpose of the audio amplifier.
2. Explain the mechanical construction of microphones and apply specific types to public-address systems.
3. Explain purpose and functions of specified speakers and speaker systems.
4. Identify and explain the purpose of reverberation units, and state their correct application to sound reproduction.
5. State the purpose of two-channel systems and apply them to maximum advantage when suitable circumstances prevail.
6. Perform the above with four-channel sound systems involving both tapes and discs.
7. Explain the value of preamplification and its application within the audio field.
8. State the purpose of audio-mixers, and connect and equalize more than two inputs by means of a mixer.
9. Perform mechanical operations on phonographs and record changers, including their operation and maintenance.

**Basic Content**

1. Audio amplifiers
2. Microphones
3. Speakers (indoor and outdoor type)
4. Reverberation units
5. Stereo amplifiers
6. Four-channel sound systems
7. Preamplifiers
8. Audio mixers
9. Phonographs and record changers
10. Cables and connectors

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Audio amplifiers | |
| Instruct students on input jacks and output jacks; input impedance and output impedance; adjustment of front-panel controls; types of speaker outputs and purposes. | a. Demonstrate audio-amplifier action at various levels of input and output.<br>b. Demonstrate the front-panel and rear-panel adjustments and speaker connections.<br>c. Have students connect various inputs and speaker systems and make all necessary adjustments. |
| 2. Microphones | |
| a. Illustrate types of microphones. | a. Demonstrate various types of microphones and their construction. |
| b. Instruct students on purpose and impedance of various types of microphones and feedback. | b. Demonstrate impedance-matching and impedance mismatch. |
| c. Instruct students on microphone care and handling. | c. Have students connect and use various microphones. |
| 3. Speakers (indoor and outdoor types) | |
| a. Illustrate types of loud speakers and baffles. | a. Demonstrate the action of the woofer, mid-range, and tweeter of various types of speakers. |
| b. Illustrate outdoor loud speakers. | b. Demonstrate the output without and with properly designed enclosures. |
| c. Instruct students on the impedance of the loud speaker. | |
| d. Instruct on speaker types: cone speaker, horn type, air-suspension type, enclosure base reflex (ducted part, auxiliary radiator, reflex, and damped bass reflex) acoustic-suspension (semi-shielded and shielded). | |
| 4. Reverberation units | |
| Instruct students on the purpose and function of the reverberation unit, reverberation chamber, reverberation period. | a. Demonstrate sound with and without reverberation.<br>b. Have students adjust units for correct amount of reverberation. |

| | | |
|---|---|---|
| 5. Stereo amplifiers and speaker systems. | | |
| | Illustrate the stereo audio amplifiers, phonographs, speaker systems, and channel separation. | a. Demonstrate monophonic as compared to stereo-type audio amplification.<br><br>b. Have students connect and balance a stereo unit. |
| 6. Four-channel sound systems. | | |
| | Illustrate the four-channel systems: tape and disc (discrete system 4-4-4 and matrix system 4-2-4 and 2-2-4); broadcast (discrete system and matrix system). | a. Demonstrate the two types of systems as used in present-day four-channel audio.<br><br>b. Have students connect and balance system. |
| 7. Preamplifiers | | |
| | Instruct student on purposes and connections of preamplifiers. Illustrate how a preamplifier may have provision for equalizing and/or mixing of multiple inputs. | Demonstrate to students that the preamplifier raises the output of low-level source so that the signal may be further processed without appreciable degradation in the signal-to-noise ratio. |
| 8. Audio mixers | | |
| | a. Instruct students on purpose and action of audio mixers.<br><br>b. Instruct students on equalizing and mixing more than two types of audio inputs. | a. Demonstrate the mixing of more than two inputs.<br><br>b. Have students connect, equalize, and mix more than two inputs. |
| 9. Phonographs, record changers | | |
| | a. Instruct students on turntable speeds, stylus-pressure indexing of pickup arm, mechanical drives, cleaning, and lubrication.<br><br>b. Instruct students on the monaural and stereo-type pickups and output impedance. | a. Demonstrate the operation of phonographs and changers.<br><br>b. Demonstrate cleaning, lubrication, adjustments, and minor repair areas.<br><br>c. Have students operate phonographs and changers.<br><br>d. Have students clean and lubricate, check table speeds, make all necessary adjustments, and disassemble for minor repairs. |

10. Cables and connectors.

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| Illustrate various types of connectors: RCA phonojack, phone jack, miniphone jack, various microphone jacks, camera jacks, jack adapters; microphone cable, phono-cables, speaker cables, camera cables, video cables, CCTV cables, and cables for temporary installations; multiple-conductor cables. Emphasize the decibel loss in video cables. | a. Have students connect up various pieces of equipment using various types of cables and jacks.<br><br>b. Emphasize the damage that can be done by adapting a jack into the wrong input or output. |

**Equipment Needed**

Public-address audio amplifier systems
Public-address audio speaker systems (Indoor and outdoor types)
Microphones
Reverberation units
Stereo amplifiers
Four-channel amplifiers
Monophonic preamplifiers
Stereo preamplifiers
Audio mixers
Stereo record changers
Audio cables and jacks
Speaker cables and jacks
Assortment of all types of jacks that may be encountered within the course
Handtools

The number of pieces of equipment and supplies will depend on student load. Ideally, there should be enough equipment so that each student has his/her own equipment.

## Unit VII – Reel-to-Reel Type Audio Tape Recorders
## Monophonic, Stereo, and Four-Channel

**(15 hours)**

**Specific Objectives**

The student will display a thorough working knowledge of reel-to-reel audio-tape recorders as follows:

1. Set up, record, and play back tapes.
2. Perform all tasks essential to the general maintenance of the recorder.
3. Identify all component parts of given systems and state the purpose of each within the system.
4. Perform all mechanical and technical operations essential to the effective recording of monophonic and stereophonic sound.

**Basic Content**

1. Function of controls
2. Input and output jacks
3. Recorder operation
4. Four or eight-track stereophonic recording
5. Disassembly
6. Cleaning
7. Lubrication
8. Demagnetizing heads
9. Adjustments
10. Electronic recording and playback stages, and power supply

**Suggested Learning Activities**

| | Classroom | Laboratory |
|---|---|---|
| 1. | Function of controls | |
| | Instruct students on function of all controls, indicator, and index counter. | Demonstrate to students the function of all controls and the result of each control action. |
| 2. | Input and output jacks | |
| | Instruct students on location and purpose of all jacks. | Have students cable-up audio tape recorder for recording from microphones, phonograph, radio (for both monophonic and stereo) |
| 3. | Recorder operation | |
| | Instruct students in the following areas: threading the tape, recording monophonically, adjusting speed selector. | Have students cable-up input to recording unit and record from microphones, phonograph, and FM radio receiver. |

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| 4. (Optional) Four or eight track stereophonic recording | |
| Instruct students on the correct setup procedure for recording sterophonic sound from microphone, phonograph, and multiplex FM radio receiver. | Have students cable up and record stereophonic sound from three different sources. |
| 5. Disassembly | |
| Instruct students on the disassembly of tape-recorder cabinet. Stress that manufacturer's instructions should be followed. | Have students disassemble and reassemble cabinet. |
| 6. Cleaning | |
| Instruct students on the correct method of cleaning pressure roller, capstan, recording heads, and erase head. | Have students clean audio tape unit. |
| 7. Lubrication | |
| Instruct students on correct method of cleaning and lubrication. Emphasize that cleaning and lubrication are not necessary under normal use, but only if a repair is made or a bearing ceases up. | Have students clean and lubricate bearings and slide levers. |
| 8. Demagnetizing heads. | |
| Instruct students on the proper method of demagnetizing the heads. | Have students demagnetize record and playback heads. |
| 9. Adjustments | |
| a. Instruct students on the correct procedure of alining record/playback head and erase head. | Have students adjust record/playback head, erase head, brake pressure, pressure-roller tension, and head elevator. |
| b. Instruct students on brake adjustment, pressure-roller-tension adjustment, and head elevator. | |
| 10. Electronic recording and playback stages, and power supply. | |
| a. Illustrate the action of the record and playback amplifiers. | a. Where vacuum-tube unit is being used, students should check and replace defective tubes. |
| b. Explain the purpose of the bias oscillator, using block diagram. | b. Have students replace defective jacks and fuses. |

**Equipment Needed**

Four- or eight-track audio tape recorders and microphones
Record changers, stereophonic
Multiplex FM radio receiver
External speaker systems
Head demagnetizer
Pre-recorded alignment tapes, four-track, eight-track, and four- channel

Brushes, soft cloth, alcohol or commercial cleaning solution

Jacks and cables should be made up for specific recorders, purchased for this unit of instruction.

## Unit VIII – Black-and-White Video Cameras

(27 hours)

**Specific Objectives**

The student will display proficiency with the black-and-white video camera as follows:

1. Perform all steps and procedures essential to its operation.
2. Describe the internal construction and operation of video camera tube.
3. Explain, maintain, and repair electronic circuits peculiar to black-and-white video cameras.
4. Troubleshoot, clean, and perform minor repairs on black-and-white video cameras as defined within this unit of instruction.
5. Effectively utilize all electronic instruments essential for trouble shooting, repair, and maintenance of camera.

**Basic Content**

1. Lens adjustments
2. Camera controls
3. Connectors
4. Tripod
5. Vidicon
6. Video signal
7. Vertical deflection
8. Horizontal deflection
9. Vertical sync and blanking
10. Horizontal sync and blanking
11. Sync generator
12. RF modulator
13. Power supply and regulation
14. Testing cables and connectors
15. Camera troubleshooting

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Lens adjustments | |
| a. Demonstrate lens for operation of all possible adjustments: focus, depth of field, and iris. | a. Have students set up lens for various scenes. |
| b. Instruct on the focus, scales, filters, and the lens turret. | b. Where lens turret is available, have students operate camera with turret. |

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|---|---|
| 2. Camera controls | |
| Illustrate location and function of all controls on camera, viewfinder, and switcher. | Have students set up camera and viewfinder for the best possible picture. |
| 3. Connectors | |
| a. Illustrate location and function of all connectors. | Have students identify and connect cables into appropriate camera connectors. |
| b. Emphasize that care must be taken when handling connectors. | |
| 4. Tripod | |
| Demonstrate connection of tripod to camera and adjustments of tripod. | Students connect and adjust tripod. |
| 5. Vidicon | |
| Illustrate vidicon internal construction and operation. | Demonstrate video camera. |
| 6. Video signal | |
| Illustrate composite waveform – Video, automatic sync, and blanking circuits. | a. Demonstrate with oscilloscope the video waveform from camera. |
| | b. Have students check camera output waveform. |
| 7. Vertical deflection | |
| a. Illustrate the vertical waveform pattern and its timing. | a. Demonstrate vertical-sweep waveforms within camera circuit. |
| b. Instruct on vertical-sweep oscillator, vertical output, and deflection coils. | b. Have students check vertical-sweep waveform signals. |
| 8. Horizontal deflection | |
| a. Illustrate horizontal-deflection-voltage waveform. | a. Demonstrate with the oscilloscope the horizontal-deflection voltage. |
| b. Instruct on horizontal oscillator, horizontal output, high-voltage circuits. | b. Have students check for correct amplitude and waveshape of horizontal-deflection voltage of the oscillator and output circuits. |

| | |
|---|---|
| 9. Vertical sync and blanking | |
| a. Illustrate the vertical-sync-pulse action on oscillator | a. Demonstrate with the oscilloscope vertical sync and blanking pulses |
| b. Instruct on sync- and blanking-pulse circuits. | b. Have students check for correct amplitude and shape of vertical-sync pulses. |
| 10. Horizontal sync and blanking | |
| a. Illustrate the horizontal sync and blanking pulses, and sync-pulse action on horizontal oscillator. | a. Demonstrate with the oscilloscope horizontal-sync and blanking pulses. |
| b. Instruct on horizontal-sync and blanking-pulse circuits. | b. Have students check for correct amplitude and wave shape of sync and blanking pulses. |
| 11. Sync generator | |
| a. Illustrate the sync waveform from the sync-wave oscillator to the final sync pulse. | a. Demonstrate with the oscilloscope the various voltage waveforms from this section. |
| b. Instruct on the oscillator, clipper, and counter circuits. | b. Have students take scope readings from various test points. |
| 12. RF modulator | |
| a. Illustrate the RF signal without and with modulation. | a. Demonstrate with the oscilloscope the RF carrier without and with modulation. |
| b. Instruct on RF modulator circuits. | b. Have students test inputs and outputs from modulator. |
| 13. Power supply and regulation | |
| a. Illustrate power-supply action by waveform and AC–DC current flows. | a. Demonstrate with the oscilloscope power-supply action. |
| b. Instruct on the power-supply and regulator circuits. | b. Have students take scope readings for correct waveforms; take voltage measurements with VOM or VTVM. |
| 14. Testing cables and connectors | |
| a. Illustrate types of connectors and cables. | a. Have students identify types of cables and connectors. They should test for defective connectors and cables. (Defective cables and connectors should be supplied to student.) |
| b. Show correct procedure for testing cables and respective connectors with ohmmeter. | b. Have students make necessary repairs. |

15. Camera trouble shooting

For most students this will not be possible due to time. Where there is an exceptional student in the class, camera-service manuals should be used as a guide.

**Equipment Needed**

Sony Video Camera Model ARC-3200 or AVC 3210
Sony Viewfinder Model AVF 3200
Sony Elevator Tripod Model VCT-20A
Single-trace oscilloscope
VOM
VTVM
Handtools

## Unit IX – Black-and-White Television Receivers and Monitors

(36 hours)

### Specific Objectives

The student will display proficiency in handling, maintaining, and using black-and-white televison receivers and monitors as follows:

1. Identify, locate, and explain the purpose of each component section of the television receiver.
2. Identify and locate input connections of receivers and monitors.
3. Name and describe the purpose of each controlling element of the cathode-ray tube.
4. Locate and describe the purpose of each section of the video chain, from receiving the RF carrier to its conversion and amplification.
5. Define and apply the principles of interlace scanning.
6. Identify vertical and horizontal scanning voltages and explain the development of these voltages through the electronic circuits.
7. Identify and explain vertical and horizontal sync pulses and their effects on vertical and horizontal oscillators.
8. Identify and recognize FM sound signals, their amplification and direction.
9. Locate defective CRT, through visual inspection and instrument testing.
10. Remove CRT and install a new CRT.

### Basic Content

1. Block-diagram analysis
2. Television receiver and monitor controls and switches
3. Connectors
4. C.R.T. (Picture tube)
5. Television and monitor tuner
6. Video IF amplifier circuits
7. Video detector circuits
8. Video amplifier
9. Interlace scanning
10. Vertical oscillator and output
11. Horizontal oscillator, output, and damper
12. Vertical and horizontal sync and blanking
13. Sync clipper
14. Keyed AGC
15. Sound IF amp
16. C.R.T. testing and replacement

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Block diagram | |
| a. Illustrate block diagram of television receiver and monitor. | Have students draw and explain the function of each block. |
| b. Instruct on function of each block. | |
| 2. Television receiver and monitor controls and switches. | |
| Illustrate location and function of controls. | Have students adjust monitor for best quality picture. |
| 3. Connectors | |
| Illustrate locations and functions of connectors. | Have students set up monitor with camera, and adjust camera and monitor for the correct picture quality. |
| 4. C.R.T. (Picture tube) | |
| a. Illustrate the physical and electrical construction of the C.R.T. | With C.R.T. tester have students test C.R.T., and with oscilloscope take readings at grid and cathode for correct waveform pattern. |
| b. Instruct on the function of each element. | |
| 5. Television and monitor tuner | |
| a. Illustrate the physical construction of the tuner. | a. Have students adjust fine tuning. |
| b. Demonstrate the correct method of cleaning the tuner contacts. | b. Have students clean and adjust tuner. |
| 6. Video IF amplifiers | |
| Illustrate the IF amplifier response curve. Relate this curve to tuner curve. | a. With sweep-marker generator and oscilloscope, demonstrate the IF response curve. |
| | b. Have students test tuner for correct response curve. |
| 7. Video detector | |
| a. Illustrate detection of the IF carrier. | a. With oscilloscope demonstrate the detected video signal. |
| b. Instruct on the frequency requirements of the detector, inter-carrier sound signal, and sound takeoff. | b. Have students test for correct output signal from detector. |

| | |
|---|---|
| 8. Video amplifier | |
| a. Illustrate operation of the video amplifier. | a. With oscilloscope demonstrate input and output signal. |
| b. Instruct on the frequency requirements of the video amplifier. | b. Have students test input and output of the video amplifier for correct waveform. |
| 9. Interlace scanning | |
| a. Illustrate frame and field rate of picture and interlace scanning. | (Not required.) |
| b. Instruct on the need for interlace scanning. | |
| c. Instruct on the trace time and retrace time of the vertical and horizontal sweep pulses. | |
| 10. Vertical sweep oscillator output. | |
| a. Illustrate the vertical oscillator and output waveforms. | a. With oscilloscope demonstrate the vertical trapazoid waveform and the effect of the vertical adjustments on this waveform and picture. |
| b. Instruct on the requirements of the vertical system, adjustments, and what area of the picture and waveform these adjustments affect. | b. Have students test for correct waveform, adjust picture for correct linearity and height. |
| 11. Horizontal oscillator, output, and damper. | |
| a. Illustrate the horizontal oscillator and output waveforms. | a. With oscilloscope demonstrate the horizontal waveforms and the effect of adjustments on this waveform. |
| b. Instruct on the requirements of the horizontal system, adjustments, and the effect of these adjustments. | b. Have students test for correct waveforms of horizontal oscillator and output, test for high voltage, adjust for correct horizontal frequency and width. |
| c. Instruct on damper circuit and high voltage requirements. | |
| 12. Vertical and horizontal sync and blanking | |
| a. Illustrate vertical and horizontal sync and blanking voltages. | a. With oscilloscope demonstrate the vertical and horizontal sync pulses, the effect of these pulses on the vertical and horizontal oscillators, the blanking pulses, and the effect of the blanking pulses on the C.R.T. electron beam. |
| b. Instruct on the sync and blanking requirements, sync clipper, vertical and horizontal takeoff circuits. | b. Have students test for correct sync and blanking pulses. |

13. Sync clipper

| | |
|---|---|
| a. Illustrate sync clipper circuit and action. | a. With oscilloscope demonstrate sync pulses. |
| b. Instruct on vertical and horizontal sync pulses, the vertical integrater, and horizontal differentiator. | b. Have students check for correct waveforms of sync. |

14. Keyed AGC

| | |
|---|---|
| a. Illustrate the effect of the AGC voltage on the RF and IF circuits. | a. With oscilloscope and VTVM, demonstrate AGC circuit action. |
| b. Instruct on AGC systems. | b. Have students test AGC circuit for waveform and correct voltages. |

15. Sound IF amp

| | |
|---|---|
| a. Illustrate the sound IF response curve and frequency requirements. | a. With sweep-marker generator and oscilloscope, demonstrate sound IF curve. Demonstrate IF alinement with incoming station carrier. |
| b. Instruct on the circuit operation and alinement with live sound. | b. Have students aline sound IF amplifiers with station carriers. |

16. C.R.T. testing and replacement

| | |
|---|---|
| a. Demonstrate defective C.R.T. removal and installation of new C.R.T. | a. Have students test C.R.T., remove from cabinet, and reinstall. |
| b. Instruct on testing C.R.T. with C.R.T. checker. | |
| c. Emphasize safety in handling C.R.T. | |

**Equipment Needed**

SC Electronics Inc., Monitor Model 5EC904
Sony Monitor Model CVM-1710
Sony Video Camera Model AVC-3200 or 3210
Sony Viewfinder Model AVF 3200
Sony Elevator Tripod Model VCT-20A
VTVM
Single-trace oscilloscope
Sweep-marker generator
Hand tools
Cables and connectors for above equipment

## Unit X – Black-and-White Videotape Recorders

(45 hours)

### Specific Objectives

The student will demonstrate effective abilities with black-and-white videotape recorders as follows:

1. Identify, describe, and operate controls and switches peculiar to video recorders.
2. Prepare video recorders to record:
   a. a television broadcast
   b. from the video camera
3. Identify and explain fully three types of recording systems.
4. State all audio, visual, and electrical changes that occur in all electronic recording and playback systems.
5. Perform routine tasks essential to the effective operation of various videotape recorders.

### Basic Content

1. Precautions
2. Record-playback controls and switches
3. Threading the video tape
4. Connectors
5. Video recorder connected to camera and monitor
6. Video recorder connected to monitor and TV receiver
7. Erasing recorded tape
8. Video recording systems
9. Recording signal
10. Modulation system
11. Recording tapes
12. Video recorder block diagram
13. Cleaning heads and slip rings
14. Lubrication
15. Drive-belt replacement
16. Video-head replacement
17. Video-head dihedral adjustment
18. Tape-tension brake check
19. Take-up idler adjustment
20. Brake-system adjustment
21. Capstan bearing and shaft adjustment
22. Automatic shutoff-switch adjustment
23. Record-button latch-linkage adjustment
24. Pinch-roller replacement
25. Microswitch adjustment

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Precautions | |
| Instruct on the precautions that should be exercised in protecting the tape recorder and tapes. | |
| 2. Record/playback controls and switches | |
| a. Illustrate location and operation of all controls and switches. | a. With video recorder set up, demonstrate functions of controls and switches. |
| b. Instruct on the functions of controls and switches. | b. Have students operate controls to become familiar with their action. |
| 3. Threading the video tape | |
| Demonstrate proper procedure for threading tape. | Have students load and operate video recorder. |
| 4. Connectors | |
| a. Illustrate types of connectors on video recorder. | a. With VTVC and oscilloscope, demonstrate the measurement of correct voltage and waveforms expected at these connectors. |
| b. Instruct on the output and input signals to the video recorder. Refer to video recorder operation manual. | b. Have students test for correct voltages and waveforms to be found on the various connectors. |
| 5. Video recorder connected to camera and monitor | |
| a. Illustrate correct method of connecting camera and monitor to video recorder. | a. Demonstrate method of connecting camera and monitor to video recorder. |
| b. Caution students on care in handling cables and jacks. | b. Have students set up and record a short live program. |
| 6. Video recorder connected to monitor and TV receiver | |
| Illustrate the correct method of connecting monitor and TV receiver to video recorder. | Have students set up and record a TV program. |

| | |
|---|---|
| 7. Erasing recorded tape. | |
| Instruct on erasing of recorded tapes by recorder and bulk erasing using a bulk eraser. | Have students erase tapes by recorder and bulk eraser. |
| 8. Video recording systems | |
| a. Illustrate recording systems – longitudinal, transverse, and helical-span techniques. | Demonstrate the helical-scan system. |
| b. Instruct on the advantages and disadvantages of each method. | |
| 9. Recording signal | a. With oscilloscope, demonstrate video recording signal. |
| Illustrate video recording signal. | b. Have students test signal with oscilloscope. |
| 10. Modulation system | |
| Illustrate the conversion of composite video signal to an FM signal for tape recording. | (No lab required.) |
| 11. Recording tapes | |
| Instruct on tape coating, width, thickness, magnetizing process, tape speeds. | (No lab required.) |
| 12. Video recorder block diagram | |
| a. Illustrate block diagram of video recorder. | Demonstrate the function of each section. With an oscilloscope, show input and output waveforms. |
| b. Instruct on the circuit function of each block. | |

## Mechanical Maintenance

**Precautions**

Emphasize that the tape guides and tapered guides of the tape path should never be tampered with, as these are adjusted at the factory and should not require realinement. If guides become damaged, the unit should be sent to factory service center for guide replacement and alinement. These guides are adjusted to very close tolerances to make it possible to interchange tapes between recorders.

Students should be warned that at no time should they attempt a repair in any mechanical area or electronic circuit unless authorized by the instructor.

| | |
|---|---|
| 13. Cleaning heads and slip rings | |
| a. Instruct that noise in the picture is usually caused by debris on the head surface. | a. Demonstrate correct method for cleaning heads. |
| b. Illustrate the correct method in cleaning video and audio heads. | b. Have students clean both audio and video heads. |
| 14. Lubrication | |
| a. Illustrate the lubrication points on the video recorder. | Have students locate and identify all lubrication points. |
| b. Define a proper lubricant and stipulate amount that should be applied to surfaces. | |
| c. Emphasize importance of following manufacturer's specifications. | |
| 15. Drive-belt replacement | |
| a. Illustrate drive-belt replacement and adjustment. | Have students remove and install drive belt and make necessary adjustments. |
| b. Instruct on recognizing need for belt replacement or adjustment. | |
| 16. Video-head replacement | |
| a. Illustrate the removal of the video-head assembly. | a. Demonstrate removal and installation of video-head assembly. |
| b. Illustrate the installation of video-head assembly. | b. Have students remove and install video-head assembly. |
| c. Instruct on recognizing the need for head replacement. | |
| 17. Video-head dihedral adjustment | |
| a. Illustrate the dihedral adjustment of the video head. | a. Demonstrate the dihedral-head adjustment. |
| b. Instruct on recognizing the need for such adjustment. | b. Have students perform the dihedral-head adjustment. |

| | |
|---|---|
| 18. Tape-tension brake check | |
| a. Demonstrate the need for tape-tension adjustment. | a. Demonstrate the tape-tension adjustment. |
| b. Instruct on the results of improper tape tension. | b. Have students adjust and check tape for correct tension. |
| 19. Take-up idler adjustment | |
| a. Illustrate capstan-motor-pulley height check, and take-up-idler height check and adjustment. | a. Demonstrate capstan-motor-pulley and take-up-idler height check and adjustment. |
| b. Instruct on identifying the need for this adjustment. | b. Have students adjust and test for normal operation. |
| 20. Brake-system adjustment | |
| a. Illustrate brake-torque and brake-timing adjustment, takeup brake-lever check, and pulse brake-lever check. | a. Demonstrate takeup brake-lever check and pulse-brake check; brake-torque and brake-timing adjustments. |
| b. Instruct on need for these adjustments and the results when these adjustments are off. | b. Have students make these adjustments and check unit for correct operation. |
| 21. Capstan bearing and shaft replacement | |
| Instruct on identifying defective capstan bearing and shaft. | a. Demonstrate correct procedure in the replacement of the capstan bearing and shaft.<br>b. Have students remove and install capstan bearing and shaft. |
| 22. Automatic shutoff-switch adjustment | |
| a. Instruct on identifying the need for automatic shutoff-switch adjustment. | a. Demonstrate correct procedure to follow in adjusting automatic shutoff switch. |
| b. Explain the correct procedure for this adjustment. | b. Have students follow correct procedure for this adjustment. |
| 23. Record-button latch-linkage adjustment | |
| Instruct on identifying need for latch-linkage adjustment, and the proper procedure for this adjustment. | Demonstrate correct procedure to follow in making this adjustment. Do not have student make this adjustment, as part of the adjustment involves the bending of audio set-lock bar with pliers. |

24. Pinch-roller replacement.

| | |
|---|---|
| a. Instruct on identifying the need for pinch-roller replacement | a. Demonstrate correct removal and replacement procedure to follow. |
| b. Instruct on procedure to follow for its removal and replacement and for pressure adjustment. | b. Have students remove, install, and adjust pressure of pinch roller. |

25. Microswitch adjustment

| | |
|---|---|
| Instruct on correct procedure on microswitch adjustment. | a. Demonstrate correct procedure for microswitch adjustment. |
| | b. Have students make correct adjustment of microswitch. |

**Equipment Needed**

Sony Videocorder Model AV-3600 or 3650
Sony Monitor Model CVM-1710
SC Electronics Inc. Monitor Model 5EC904
Sony Video Camera Model AVC 3200 or 3210
Sony Viewfinder Model AVD 3200
Sony Elevator Tripod Model VOT-20A
Blank video tapes
Sony alinement tape
Supply of methyl ethyl ketone
Bulk magnetic tape eraser
VTVM
Single-trace oscilloscope

## Unit XI – Color Video Cameras

(21 hours)

### Specific Objectives

Students will demonstrate proficiency in the operation and general maintenance of the color video camera as follows:

1. Set up and make necessary adjustments for quality image pickup.
2. Perform routine maintenance and service tasks essential to the effective operation of color video cameras.
3. Identify color-camera output signals with oscilloscope and analyze the waveforms.

### Basic Content

1. Camera optics
2. Camera controls and connectors
3. Focus control
4. Pedestal control
5. Gain control
6. Target switch
7. Video switch
8. Beam adjust
9. Functional description
10. Removing the camera housing
11. Video preamplifier
12. Video processor
13. Encoder
14. Sync generator
15. Deflection/scan generator
16. Automatic focus
17. Camera power supply
18. Camera-control-unit power supply
19. Sync buffer amplifier
20. Sync adapter
21. New vidicon installation
22. Viewfinder
23. Camera-control unit
24. The two-tube, three-tube, and four-tube color cameras

### Suggested Learning Activities

#### Single-Tube Video Color Camera

| Classroom | Laboratory |
|---|---|
| 1. Camera optics | |
| a. Illustrate the physical construction of the optic system. | Disassemble camera optical system. Identify all components of this system. |

b. Identify the lens, spatial-frequency filter (SFF), dichroic gratings, and relay lens.

c. Illustrate and instruct students on the operation of the SFF.

d. Instruct students on the development of the composite NTSC compatible output signal from this system.

2. Camera controls and connectors

a. Review all controls common to black-white and color cameras.

b. Instruct students on all special controls inherent to color cameras.

c. Identify and locate all camera connectors and jacks.

d. Instruct students on the type of connectors and jacks built into the color camera.

3. Focus Control

Instruct on the operation of the focus (manual and automatic).

Have students set up camera for correct focus.

4. Pedestal Control

Instruct on setting the correct level of brightness.

Have students set up camera for the correct level of brightness for a given scene.

5. Gain control

Instruction on adjusting camera for the proper level of video information.

Have students adjust gain control for the proper level of video information for a given scene.

6. Target switch

Instruct on the operation of the target switch for both manual and automatic modes.

Have students operate the camera for manual and automatic modes.

7. Video switch

| | |
|---|---|
| Instruct students on the operation of the video switch. | Have students operate camera in the camera and color bar positions. |

8. Beam adjust

| | |
|---|---|
| Instruct on correct setting of the beam-adjust control. | Have students set up beam adjust for proper setting. |

9. Functional description of color camera

a. Illustrate the block diagram of the color video camera. If plug-in module cameras are available, compare the block diagram with the various modules in the camera.

b. Instruct students on the functions and output waveforms of each block.

c. Have students draw the block diagram of the color camera and identify the functions of each section.

10. Removing the camera housing

| | |
|---|---|
| Instruct students on the removal of the camera housing. | Have students remove and reinstall camera housing. |

Subassemblies (Modules)

11. Video preamplifier
12. Video processor
13. Encoder
14. Sync generator
15. Deflection/scan generator
16. Automatic focus
17. Camera power supply
18. Camera-control-unit power supply
19. Sync buffer amplifier
20. Sync adapter

On the listed circuit subassemblies, the following instructions should be followed:

| | |
|---|---|
| a. Instruct students on the operation of the circuit. | a. Demonstrate with the oscilloscope all waveforms. |
| b. Illustrate and identify all waveforms. | b. Have students test subassemblies with the oscilloscope for correct output signals. |
| c. Emphasize care in handling these subassemblies and placing test probes into the circuits. | c. Disable sections of the subassemblies to demonstrate the effect on the reproduced picture. |

21. New vidicon installation

| | |
|---|---|
| a. Instruct on recognizing the need for a new vidicon. | a. Demonstrate the proper procedure for removal and installation of the vidicon. |
| b. Instruct students on the correct procedure for removing vidicon and installing new one. | b. Demonstrate the correct setup for burn-in time. |
| c. Instruct students on the correct burn-in time for a new vidicon. | c. Have students remove and install vidicon. |
| d. Emphasize the importance of referring to the service manual for the vidicon replacement. | d. Have students set up vidicon for burn-in time. |

22. Viewfinder

| | |
|---|---|
| Instruct students on the operation and controls of the viewfinder. | Have students set up and adjust the viewfinder. |

23. Camera-control unit

| | |
|---|---|
| a. Instruct on the operation of the camera-control unit. | a. Have students set up camera-control unit with two cameras. |
| b. Illustrate the front panel. Instruct students on function of all controls. | b. Have students adjust cameras with control unit to produce equal reproduction of a given scene. |
| c. Illustrate the rear panel. Identify each connector or jack. | c. Demonstrate removal of unit housing. Point out areas which may need maintenance. |
| d. Instruct students on general maintenance of this unit. | |

24. The two-tube, three-tube, and four-tube color cameras

| | |
|---|---|
| Briefly discuss and illustrate the operation of the two-tube, three-tube, and four-tube color cameras. | |

**Equipment**

Magnavox Chroma vue Color Camera, Model CU300
Magnavox Camera Control Unit, Model CCU CC-301
Magnavox Viewfinder, Model VF003
Magnavox zoom lens
Conrac Color Television Monitor with Underscan, Model RHA-19
Tektronix Waveform Monitor, Model RM 529

Magnavox Optical Test Bench, Model MVSOTB-1
Vectorscope
Frequency counter
Magnavox Vidicon Simulator, Model MVS-VS-1
Cosmicar 50mm, 8/2.8 lens #218
Magnavox Adapter, C Mount Lens MVS MC-1
Tele-Measurements Light Box, with Slide, Model IIRS No. 63-71
Hilger and Watts Autocollimeter, Model TA60-1
Magnavox Autocollimeter Adapter, Model 114432-801
Kodak Wratten Filter, Red #29
Kodak Wratten Filter, Blue #47B
EIA Log Reflectance Chart
Single-Trace Oscilloscope
VTVM

## Unit XII – Color Television Receivers and Monitors

(39 hours)

**Specific Objectives**

The student will demonstrate the ability to set up, service, and maintain the color-television receiver and monitor as follows:

1. Adjust front panels to produce a quality color picture.
2. Identify and explain the functions of all contributing sections to the reception of RF composite video signals and to conversion, detection, and amplification of the luminance signal.
3. Explain the recovery of the color signal through amplification, demodulation, and separation into three color-difference signals.
4. Perform all gray-scale adjustments as required.
5. Define and cite significance of both static and dynamic convergence procedures.
6. Perform routine tasks essential to the maintenance of color TV receivers and monitors.

**Basic Content**

1. Review of all sections common to black-and-white and color-television receivers
2. Block diagram
3. Color-television receiver and monitor connectors, controls, and switches.
4. The color CRT
5. Television-monitor tuner
6. Video IF amplifier circuits
7. Video and sound take-off detectors
8. First and second video (luminance) amplifiers
9. Delay line
10. Final video (luminance) amplifier
11. Vertical and horizontal scanning oscillators
12. Vertical output amplifiers
13. Horizontal output amplifiers
14. Sync clipper, AGC and AFC circuit review
15. Band pass amplifiers
16. Burst amplifiers
17. 3.58mc Oscillator and control
18. Color demodulators
19. The matrix
20. R–Y, B–Y, and G–Y amplifiers
21. Power supplies
22. FM sound system
23. Color CRT circuits
24. Gray-scale tracking
25. Static convergence
26. Dynamic convergence

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Review of all circuits and adjustments common to both color and black-and-white television. | (Not required) |
| 2. Block diagram | |
| a. Illustrate the block diagram of color television receiver. | (Not required) |
| b. Instruct on the function of each block. | |
| 3. Color-television receiver and monitor connectors, controls, and switches | Have student set up receiver or monitor for correct picture quality. |
| a. Illustrate location and function of connectors. | a. Have students connect video camera to a television receiver or monitor. |
| b. Illustrate the locations and functions of controls and switches. | b. Have students adjust all controls and switches for correct picture quality. |
| 4. The color CRT | |
| a. Illustrate trigun and single-gun type CRT's. | a. With CRT tester have students test CRT. |
| b. Instruct on the action of each element of the trigun and the single-gun CRT. | b. With oscilloscope have students take readings at grids and cathodes for correct waveforms. |
| | c. With VOM and high voltage probe, have students take voltage readings of all elements. |
| 5. Television-monitor tuner | |
| a. Review operation of tuner. | Have students properly tune in television carriers to produce good video and color information. |
| b. Instruct on the loss of color information due to mistuning. | |
| c. Instruct on AFT operation. | |

| | |
|---|---|
| 6. Video IF amplifier circuits. | |
| a. Illustrate the correct response curve and relate this to tuner curve. | a. Demonstrate video IF response curve with oscilloscope. Misaline curve to produce no color |
| b. Analyze curve and instruct students on the location of the color information on the response curve and why a misalined IF amplifier could produce good picture with no color. | b. Have students analyze correct and incorrect curves. |
| | c. Emphasize to students that IF amplifiers need not be alined unless they have been tampered with or repairs are made. |
| 7. Video and sound takeoff detectors. | |
| a. Illustrate location of detectors by block diagram and schematic. | a. With oscilloscope and RF generator, demonstrate the operation of the detectors. |
| b. Instruct on the need for two separate detectors and their operation. | b. Have students check and analyze detected waveforms. |
| 8. First and second video (luminance) amplifiers | |
| a. Illustrate by block and schematic diagram location and function of 1st and 2nd video amplifiers. | a. Demonstrate with video generator and oscilloscope the waveforms expected at inputs and outputs of video amplifiers. |
| b. Instruct on circuit operation. | b. Have students test for correct waveforms. |
| c. Instruct on blanking pulses and DC reinsertion. | |
| 9. Delay line | |
| a. Illustrate the physical construction of the delay line. | Demonstrate the picture results with and without delay line. |
| b. Instruct on the need for and operation of the delay line. | |
| 10. Final video (luminance) amplifier | |
| a. Illustrate by block and schematic diagram the final video amplifier. | Demonstrate the input and output waveforms with and without video peaking. |
| b. Instruct on video amplifier and video peaking operation. | |
| 11. Vertical and horizontal scanning oscillators. If students require, review oscillator operations. | (Not required) |

| | |
|---|---|
| 12. Vertical output amplifiers | |
| a. Illustrate the vertical output amplifier and the production of dynamic convergence pulses. | a. With oscilloscope demonstrate the vertical sweep pulses and the vertical dynamic pulses. |
| b. Instruct on the need for a greater output in comparison to black and white. | b. Have students check for correct pulses. |
| c. Instruct on the need for dynamic convergence waveform. | |
| 13. Horizontal output amplifiers | |
| a. Illustrate the horizontal output amplifier circuits and production of horizontal dynamic pulse. | a. With oscilloscope demonstrate the horizontal drive and dynamic convergence pulses. |
| b. Instruct on the requirements of the horizontal circuits. | b. Have students check for correct pulses. |
| 14. Sync clipper, AGC, AFC | |
| If students require, review sync clipper, AGC and AFC operation. | (Not required) |
| 15. Bandpass amplifiers | |
| a. Illustrate the location and operation of the bandpass amplifier and separation of color information from composite video. | a. Demonstrate with the oscilloscope and color-bar generator the separation of color information from the composite signal. |
| b. Instruct on the separation of the 3.58mc color information and how color is represented by this signal. | b. Have students check for correct waveform. |
| 16. Burst amplifier | |
| a. Illustrate the location of the burst signal on the back porch of the blanking pulse and its separation. | a. Demonstrate with the oscilloscope and color-bar generator the separation of burst signal. |
| b. Instruct on the need for and function of the burst signal. | b. Have students check for correct signal. |
| 17. 3.58mc Oscillator and control | |
| a. Illustrate location and operation of the 3.58mc oscillator, the phase detector, and control. | a. Demonstrate with oscilloscope the operation of oscillator and control pulses. |
| b. Instruct on the purpose and function of the 3.58 oscillator. Instruct on the 3.58 oscillator control. | b. Have students check for correct waveforms of oscillator and phase detectors. |

| | | |
|---|---|---|
| 18. Color demodulators | | |
| | a. Illustrate various types of color-signal demodulators. | a. Demonstrate with the oscilloscope the separation of the two color signals from the 3.58mc carrier. |
| | b. Instruct on the operation of the color demodulators. | b. Have students check for correct waveform of input and output signals. |
| 19. The matrix | | |
| | a. Illustrate the color matrix and its operation. | a. Demonstrate with the oscilloscope the operation of the matrix. |
| | b. Instruct on the requirements of the matrix and the separation of the color signals. | b. Have students check out matrix for correct operation. |
| 20. R–Y, B–Y, G–Y amplifiers | | |
| | a. Illustrate the location and waveforms of the –Y amplifiers. | a. Demonstrate with oscilloscope the input and output waveforms of the three amplifiers. |
| | b. Instruct on the color signals and the makeup of the color picture on the CRT with addition to luminance. | b. Have students check amplifiers for correct waveforms. |
| 21. Power supplies | | |
| | a. Illustrate types of power supplies and their requirements. | a. Demonstrate various waveforms throughout power supplies. |
| | b. Instruct on power-supply operation, voltage, multipliers, voltage regulators, and transistor power supplies. | b. Have students take oscilloscope readings and voltage readings with VOM or VTVM. |
| 22. FM Sound System | | |
| | a. Illustrate sound takeoff and FM sound system. | a. Demonstrate with RF generator, VTVM, and oscilloscope the function of the sound system and alinement. |
| | b. Instruct on the intercarrier FM sound signal, sound takeoff, and various types of sound systems. | b. Have students check sound system for correct sound IF and detector response. |
| 23. Color CRT Circuits | | |
| | a. Illustrate the operation of tri-color CRT circuits. | Demonstrate the electron-gun construction with exposed guns. If exposed guns are not available, demonstrate with complete CRT's. |
| | b. Instruct on circuit requirements and operation. Illustrate the operation of the single-gun CRT Circuit. | |
| | c. Instruct on the requirements and operation of the single-gun CRT and circuits. | |

24. Gray-scale tracking

| | |
|---|---|
| a. Demonstrate setting up purity and gray-scale tracking. | Have students set up CRT for purity and gray-scale tracking. |
| b. Instruct on the need for this adjustment. | |
| c. Instruct on the mixing of colors to produce black and white. | |

25. Static convergence

| | |
|---|---|
| a. Demonstrate static convergence. | Have students perform static-convergence adjustments. |
| b. Instruct on static-convergence magnet action and location. | |

26. Dynamic convergence

| | |
|---|---|
| a. Demonstrate vertical and horizontal dynamic convergence. | a. Have students set up vertical dynamic convergence. |
| b. Instruct on the location and operation of dynamic-convergence controls. | b. Have students set up horizontal dynamic convergence. |
| | c. Have students perform complete dynamic and static convergence. |

**Equipment Needed**

Sony Color Monitor Model 1710
Magnavox Chromavue Color Camera Model CV300
Magnavox Viewfinder Model VF033
VTVM
VOM
Single-trace oscilloscope

## Unit XIII – TV Studio Equipment and Operations

**(12 hours)**

### Specific Objectives

The student will demonstrate abilities to work within studios by performing the following:

1. Set up and operate camera switcher and switcher-fader systems.
2. Identify, explain purpose of, and apply all controls needed for television-program production.
3. Identify the block diagram and the circuit operation of the special effects generator.
4. Apply the special-effects generator within the television studio to maximum advantage.
5. Identify and describe the camera-chain components commonly utilized within a studio setting.

### Basic Content

1. Camera switcher
2. Switcher-fader
3. Special-effects generator
4. Special-effects generator: operation of controls
5. Rear-panel connectors
6. Special effects generator block diagram
7. Multiple-studio system
8. The camera chain

### Suggested Learning Activities

| | Classroom | Laboratory |
|---|---|---|
| 1. | Camera switcher<br><br>Instruct on the simplest form of camera switcher. | Set up and demonstrate the simple switcher. Have students wire up switcher, and perform camera switching. |
| 2. | Switcher-fader<br><br>Instruct on the operation of the switcher-fader. | Have students wire up switcher and fader and perform switching and fading of two or more cameras. |
| 3. | Special-effects generator<br><br>Demonstrate the operation of the special-effects generator with one, two, and four cameras. | Set up multiple-camera system and monitors. Have students operate the special-effects generator. |

4. Special-effects generator: operation of controls

| | |
|---|---|
| Demonstrate the operation of all the facilities of this generator with multiple cameras and monitors. | (Not required). |

5. Rear-panel connectors

| | |
|---|---|
| Instruct on location and function of all output jacks. Emphasize necessary safety and maintenance precautions. | Have students set up special-effects generator with multiple cameras and monitors, and produce a show using all possible effects from this generator. |

6. Special-effects generator block diagram

| | |
|---|---|
| a. Illustrate the block diagram of the generator, with identification of each block and its function. | Demonstrate to students waveforms present within this unit. Locate and identify each on block diagram. |
| b. Instruct on basic circuit operation. | |

Caution: *This unit should be serviced by Sony Service Center*

7. Multiple-studio system

| | |
|---|---|
| Illustrate studio system for switching between cameras, audio-tape recorder, video-tape recorder, slide and motion-picture projectors, fed through multiplexer. Illustrate use of microphones with audio mixers. | Have students set up a multiple system for a short program. |

8. The camera chain

| | |
|---|---|
| a. Illustrate the camera chain by block diagram. | If TV studio is available, have students operate cameras from control room. |
| b. Instruct on the function of each unit and component when not included in the camera assembly, and the advantage of central control room. | |

**Equipment Needed**

Sony Special Effects Generator Model SEG-1
Two or more Sony Video Cameras Model VC 3200 or 3210
Sony Videocorder Model AV 3600 or 3650
Sony Viewfinder Model AVF 3200
Sony Elevator Tripod Model VCT 20A
Sony Monitor Model CVM 1710
Two or more microphones, low-impedance type
Cables and jacks for above equipment
Camera switcher and switcher-fader

## Unit XIV – Television Film Projectors

(3 hours)

**Specific Objectives**

The student will demonstrate the ability to work with television film projectors and systems as follows:

1. Set up slide and film-strip projectors for television programing.
2. Set up motion-picture projectors adapted for television programing.
3. Set up slide, film-strip, and motion-picture projectors with multiplexer for television programing.

**Basic Content**

1. Multiplexer
2. Slide and film-strip projection for television
3. Motion picture projector for television

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. The multiplexer | |
| Illustrate layout and multiplexer action. | Demonstrate multiplexer action. |
| 2. Slide and film-strip projectors | |
| a. Illustrate arrangement of projectors and camera, using a multiplexer input to the camera. | Where equipment is available, demonstrate operation of projectors with camera. |
| b. Instruct on high quality of optical system needed. | |
| 3. Motion-picture projector | |
| a. Illustrate projection arrangement of two slide projectors and motion-picture projector set up to feed through the multiplexer. | Where equipment is available, demonstrate the operation of the motion-picture projector, slide projector, and the film-strip projector with multiplexer and camera. |
| b. Instruct on the difference between the frame rate of television and the frame rate of the motion-picture projector. | |

**Equipment Needed**

Multiplexer
Slide projector
Film-strip projector
Motion-picture projector adapted for television production

## Unit XV – Closed-Circuit Television Systems

**(42 hours)**

### Specific Objectives

The student will demonstrate the ability to work with closed-circuit television systems as follows:

1. Design, set up, and operate a complex studio closed-circuit television system.
2. Effectively set up and operate television cameras.
3. Choose suitable lenses for different types of scenes.
4. Make the necessary adjustments to the CCTV System as required to secure effective distribution and amplification.
5. Perform routine tests and analyses needed for the effective maintenance of closed-circuit TV studios and distribution systems.

### Basic Content

1. Applications of closed-circuit television
2. Block-diagram analysis of closed-circuit television studio system.
3. Remote control
4. Switcher, switcher-fader, and special-effects generators
5. Power supplies
6. Pulse (sync) generators
7. Distribution amplifiers
8. Tapoffs
9. Equalizers
10. Isolation amplifiers
11. Line terminators
12. Traps
13. Matching transformers
14. Attenuators
15. Decibels
16. Cable loss
17. Splitter loss
18. Insertion loss
19. Isolation loss
20. Designing a closed-circuit television distribution system
21. Testing and maintenance of the complete closed-circuit television system.

### Suggested Learning Activities

| Classroom | Laboratory |
|---|---|
| 1. Applications of closed-circuit television systems | |
| Instruct on the application of the CCTV system for industrial, educational, research, and community-antenna systems. | (Not required) |

| | | |
|---|---|---|
| 2. Block-diagram analysis of closed-circuit television studio system. | | |
| | Illustrate CCTV systems from the basic to the complex. | (not required) |
| 3. Remote control | | |
| | Instruct on remote-control systems for the zoom lens, iris control, pan and tilt controls. | a. Demonstrate the operation of the remote-control unit.<br><br>b. Have students operate remote control for all possible operations. |
| 4. Switcher, switcher-fader, and special-effects generators | | |
| | Review the operation of the switcher, switcher-fader, and special-effects generator. | Have students set up and operate camera and monitor with these devices. |
| 5. Power supplies | | |
| | Instruct on power-supply requirements when they are located in the control room. | a. Where control room is available, demonstrate to students its location and tie-in with studio equipment.<br><br>b. Have students adjust supply and locate fuses. |
| 6. Pulse (sync) generators | | |
| | Instruct on pulse-generator requirements and the application of the pulse generator to the video camera and the transmitted signal. | a. Where control room is available, demonstrate the pulse-generator function.<br><br>b. Have students adjust for pulse amplitude and frequency. |
| 7. Distribution amplifiers | | |
| | a. Illustrate with the block diagram the operation of the distribution amplifier.<br><br>b. Instruct on the application of the distribution amplifier where more than one monitor receives the video signal, or when long cable runs are made. | a. Have students set up camera amplifier and several monitors.<br><br>b. Have students set up and operate equipment with long cable runs. |
| 8. Tapoffs | | |
| | a. Illustrate the standard and variable isolation tapoffs with 75 and 75/300 ohm impedance. | Have students set up distribution lines with multiple tapoffs. |

| | |
|---|---|
| b. Instruct on the applications and requirements of tapoffs – the standard tapoff and the variable isolation tapoff. | |
| c. Emphasize the necessity of matching impedance. | |
| 9. Equalizers | |
| Instruct on the application of the equalizers for correction of attenuation and for phase-shift of video signals. | Demonstrate the operation of the equalizers. |
| 10. Isolation amplifiers | |
| a. Instruct on the application of isolation amplifiers installed on monitors in studio. | Have students set up studio monitors with and without isolation amplifiers, to see the effects on video recordings when switching monitors. |
| b. Illustrate the effects on a recorded or transmitted signal without this separation. | |
| 11. Line terminator | |
| Instruct on the need for line termination to prevent reflections. | Demonstrate line with and without termination. |
| 12. Traps | |
| Instruct on frequency-sensitive devices to remove unwanted signals that cause interference. | Have students install and adjust variable traps. |
| 13. Matching transformers | |
| Instruct on the requirements and needs of impedance-matching transformers. | Demonstrate system with and without matching transformers. |
| 14. Attenuators | |
| Instruct on the requirements of line attenuators. | Demonstrate the effect of attenuators on the RF transmitted signal. |
| 15. Decibels | |
| Instruct on the use of decibel measurements to compute signal loss or gain. | Have students compute and measure the gain of an amplifier. |

16. Cable loss

| | |
|---|---|
| Instruct on the degree of signal loss per thousand feet of wire. | Have students set up a cable run and measure and compute the signal loss |

17. Splitter loss

| | |
|---|---|
| Instruct on various types of splitters and the loss of signal due to their installation in the line; how to compute such losses for system design. | Have students set up RF transmission lines with splitters, and measure and compute the loss. |

18. Insertion loss

| | |
|---|---|
| Instruct on the losses created by inserting tapoffs into the line; how to compute such losses for system design. | Have students set up transmission lines with tapoffs, and measure and compute the losses due to the tapoffs. |

19. Isolation loss

| | |
|---|---|
| a. Instruct on loss of signal through the inserted tapoffs. | Have students measure line signal and available signal at the tapoff. |
| b. Instruct on the line signal remaining and the signal available at the tapoff for television or monitor. | |

20. Designing a closed-circuit television distribution system

| | |
|---|---|
| a. Illustrate simple and complex distribution systems. | a. Have students lay out and hook up their designed systems. |
| b. Have students design a distribution system with multiple branches and tapoffs. | b. Have students test their systems for all losses and available signal at each tapoff. |
| | c. Have students set up cameras, video recorders, and transmitters. |
| | d. Have students transmit signals into their system. |
| | e. Have students connect monitors and test for pictures with good resolution without smear or noise. |

21. Testing and maintenance of the complete closed-circuit television system

| | |
|---|---|
| Instruct on testing procedure and repair of equipment and distribution lines. | Insert defects into system and have students troubleshoot and repair. |

**Equipment Needed**

Sony Video Camera Model AVC 3200 and 3210
Magnavox Chromavue Color Camera Model CV300
Video color monitor
Sony Viewfinder Model AVF 3200
Magnavox Viewfinder Model VF003
Sony Sync Generator Model CG-101
Magnavox Camera Control Model CC303/304
Sony Color Special-Effects Generator Model SEG-600
Motion picture projector adapted for television
DuKane strip projector
Kodak slide projector
Multiplexer
Distribution amplifier
RF mixers
Video mixers
Attenuators
Splitters
Tapoffs
Terminators
Matching transformers
Isolation amplifiers
Traps
Frequency counter
Oscilloscope
VTVM
VOM
Field-strength meter
RF sweep generator with markers

## Unit XVI – Color Video-tape Recorders

(45 hours)

### Specific Objectives

The student will demonstrate effective abilities with color videotape recorders as follows:

1. Identify, describe, and operate controls and switches peculiar to color video recorders.
2. Prepare color video recorders to record and play back.
3. Prepare the color-editing-type color-video recorder to edit recorded tape.
4. Recognize the need for minor repairs and adjustments.
5. Perform routine tasks essential to the effective servicing and maintenance of various color video recorders.

### Basic Content

1. Precautions
2. Record-playback controls, switches, and indicators
3. Editing controls
4. Threading the video tape
5. Rear-panel connectors and controls
6. Color video recorder connected to camera and monitor
7. Color video recorder set up to record live telecast
8. Color video recorder set up for editing
9. Erasing tape
10. Cleaning the tape heads
11. Cleaning the tape path
12. Demagnetizing the heads
13. Cabinet removal
14. Lubrication
15. Drive-belt replacement
16. Video-head replacement
17. Video-head dihedral adjustment
18. Tape-tension brake check
19. Takeup idler adjustment
20. Capstan bearing and shaft replacement
21. Automatic-shutoff-switch adjustment
22. Pinch-roller replacement and pressure adjustment
23. Block diagram of color-editing video-tape recorder

### Suggested Learning Activities

| Classroom | Laboratory |
|---|---|
| 1. Precautions | |
| Instruct on the precautions that should be exercised in protecting the tape recorder and tapes. | (Not required) |

| | |
|---|---|
| 2. Record–playback controls, switches, and indicators | |
| a. Illustrate location and operation of all controls and indicators. | a. Set up color video recorder. Demonstrate the functions of all controls and indicators. |
| b. Instruct on the function and purpose of controls and indicators. | b. Have students operate controls and use indicators. |
| 3. Editing controls | |
| Illustrate the purpose and functioning of editing controls. | a. Demonstrate with color-video recorder the editing of a video tape. |
| | b. Have students operate editing controls. |
| 4. Threading the video tape | |
| Illustrate the correct method of threading the color videotape recorder. | a. Demonstrate the threading of the color video-tape recorder. |
| | b. Have students properly thread the recorder. |
| 5. Rear-panel connectors and controls | |
| a. Illustrate the rear-panel connectors and controls. | Demonstrate the function of all connectors on controls through actual operation with associated components. |
| b. Instruct on the purpose of each. | |
| 6. Color video recorder connected to camera and monitor | |
| Illustrate the proper method of connecting the color video recorder to a camera and monitor. | a. Demonstrate the hookup and operation of the color video recorder connected to camera and monitor. |
| | b. Have students connect and operate this system. |
| 7. Color video recorder set up to record live telecast | |
| Illustrate method of setting up recorder for recording live telecast, through monitor. | a. Demonstrate the recording of a live telecast. |
| | b. Have students set up recorder and record a short portion of a live telecast. |

| | |
|---|---|
| 8. Color video recorder set up for editing | |
| a. Illustrate procedure in editing video tape, using color video recorder, multiplexer, still and motion film projectors, audio-tape recorders, and color video cameras. | a. Demonstrate editing of video tape. |
| | b. Have students set up and edit video tape, using all associated equipment necessary. |
| b. If necessary review operation of associated equipment. | |
| 9. Erasing tape | |
| Review partial and bulk tape-erasing methods. | Demonstrate partial and bulk tape erasing. |
| 10. Cleaning the tape heads | |
| Illustrate the correct method of cleaning the video and erase heads. | a. Demonstrate the proper method of cleaning video and erasing heads. |
| | b. Have students clean heads. |
| 11. Cleaning the tape path | |
| a. Illustrate the correct method of cleaning tape path. | a. Demonstrate the correct method of cleaning tape path. |
| b. Instruct students on the effects of a dirty tape path. | b. Have students clean tape path. |
| 12. Demagnetizing the heads | |
| a. Illustrate correct method of demagnetizing the heads. | a. Demonstrate proper method of demagnetizing the heads. |
| b. Instruct students on the effects of magnetized heads. | b. Have students demagnetize heads. |
| 13. Cabinet removal | |
| a. Demonstrate the disassembly and reassembly of the recorder cabinet and panels. | Have students disassemble and reassemble the video-recorder cabinet. |
| b. Emphasize the care that should be taken in retaining 2N screws, bolts, nuts, and components. | |

| | |
|---|---|
| 14. Lubrication | |
| a. Illustrate the points to be lubricated. | Have students locate and identify all lubrication points. |
| b. Define proper lubricant and state amount that should be applied to surfaces. | |
| c. Emphasize importance of following manufacturer's specifications. | |
| 15. Drive-belt replacement | |
| a. Illustrate drive-belt replacement and adjustment. | Have students remove and install drive belts and make necessary adjustments. |
| b. Instruct on recognizing and need for belt replacement or adjustment. | |
| 16. Video-head replacement | |
| a. Illustrate the removal of video-head assembly. | a. Demonstrate the removal and installation of video-head assembly. |
| b. Illustrate the installation of video-head assembly and head alinement. | b. Have students remove and install video-head assembly. |
| c. Instruct on recognizing the need for head replacement. | |
| 17. Video-head dihedral adjustment | |
| a. Illustrate the dihedral adjustment of the video heads | a. Demonstrate the dihedral head adjustment. |
| b. Instruct on recognizing the need for such adjustment. | b. Have students perform the dihedral head adjustment. |
| 18. Tape-tension brake check | |
| a. Instruct on the need for correct tape tension and the results of incorrect tension. | a. Demonstrate and correct any incorrect tape tension. |
| b. Illustrate the tape-tension brake assembly and adjustment points. | b. Have students check and adjust for correct tension. |

| | |
|---|---|
| 19. Takeup idler adjustment | |
| a. Illustrate capstan-motor-pulley height check, and takeup-idler-height check and adjustment. | a. Demonstrate capstan-motor-pulley and takeup-idler-height checks and adjustments. |
| b. Instruct on recognizing the need for this adjustment. | b. Have students adjust and test for normal operation. |
| 20. Capstan bearing and shaft adjustment | |
| a. Instruct on identifying a defective capstan bearing and shaft. | a. Demonstrate capstan-bearing and shaft replacement. |
| b. Illustrate correct replacement procedure and adjustments. | b. Have students check capstan. |
| 21. Automatic shut-off-switch adjustment | |
| a. Instruct on recognizing the need for automatic shut-off-switch adjustment. | a. Demonstrate correct procedure for automatic shut-off-switch adjustment. |
| b. Illustrate the correct procedure for this adjustment. | b. Have students follow correct procedure for this adjustment. |
| 22. Pinch-roller replacement and pressure adjustment | |
| a. Demonstrate location, replacement, and adjustment of the pinch roller. | a. Demonstrate pinch-roller replacement and pressure adjustment. |
| b. Instruct students on the correct method for pinch-roller pressure adjustment. | b. Have students remove pinch roller, reinstall it, and adjust for correct pinch-roller pressure. |
| 23. Block diagram of color-editing videotape recorder | |
| a. Illustrate the block diagram of the color video recorder. | (Not required) |
| b. Instruct on the function of each block. | |

**Equipment Needed**

Sony Color Camera Model DXC-5000BP
Magnavox Chromavue Color Video Camera Model CV300
Magnavox Viewfinder Model VF003
Sony Editing-Type Color Video-Tape Recorder Model UV-340
Sony Special-Effects Generator Model SEG-600
Multiplexer
Slide projector
Motion-picture projector adapted for television production
Recording head demagnetizer
All necessary jacks and cables

## Unit XVII – Television Projectors

(6 hours)

**Specific Objectives**

The student will display abilities in working with television-projection systems as follows:

1. Identify the controlling elements of the projection tube and list the ranges of control available for each.
2. Identify and explain the operation of the TV projection optical system.
3. Effectively clean and maintain the optical system.

**Basic Content**

1. Projection tube
2. Schmidt optical system
3. Cleaning optical system
4. Adjustments of optical system and receiver

**Suggested Learning Activities**

| | Classroom | Laboratory |
|---|---|---|
| 1. | Projection tube | |
| | a. Illustrate the physical construction of projection tube. | Demonstrate projection tube and care in handling. |
| | b. Instruct on the operation of the projection tube, and requirements. | |
| 2. | Schmidt optical system | |
| | a. Illustrate the Schmidt optical system. | Demonstrate the physical makeup of the optical system. |
| | b. Instruct on the Schmidt optical system, parabolic reflector, and the corrector lens. | |
| 3. | Cleaning optical system | |
| | Instruct on the cleaning of projection tube, parabolic reflector, and corrector lens. | Demonstrate cleaning of the optical system. Emphasize care in handling this unit. |

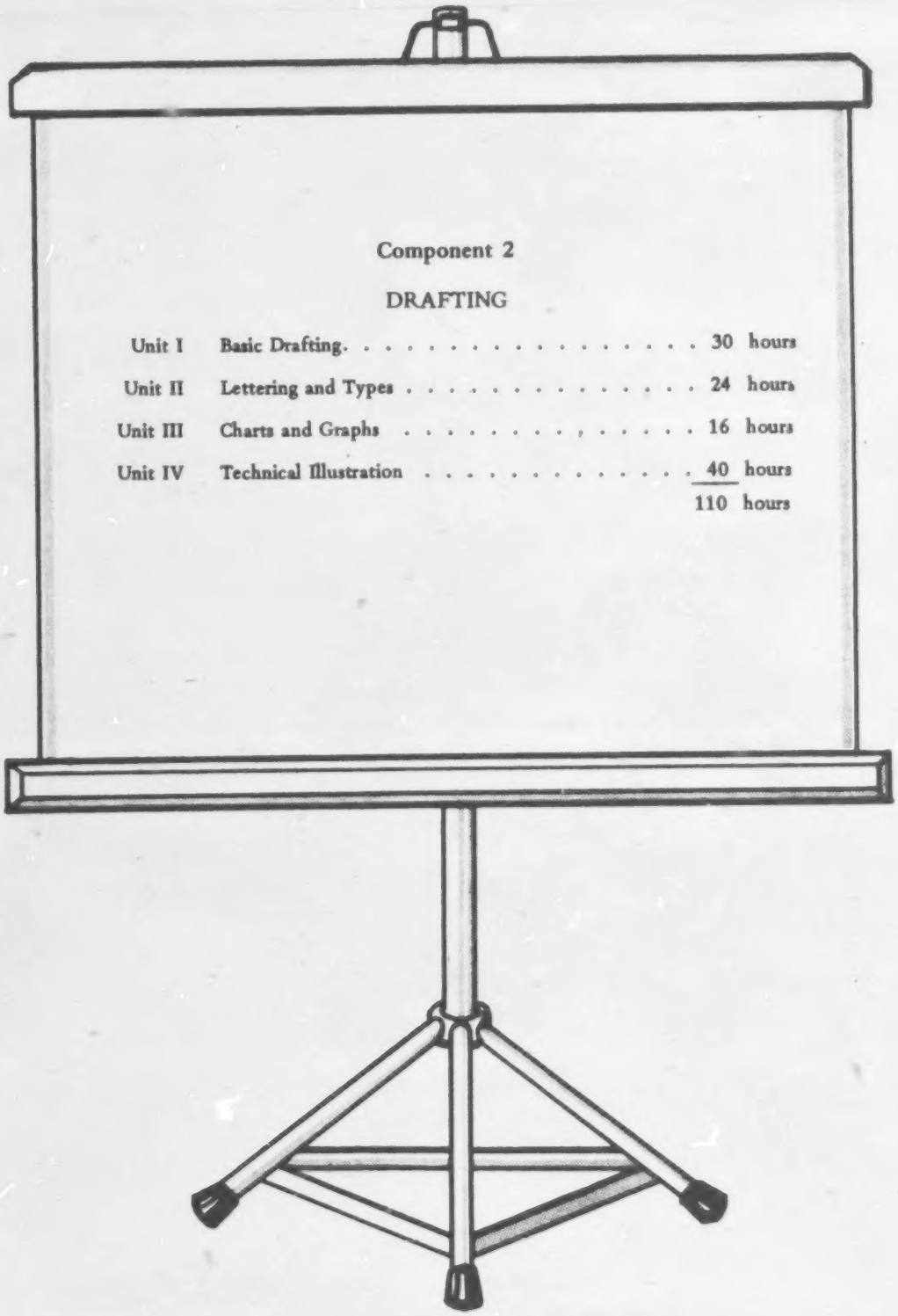
4. Adjustments of optical system and receiver

| | |
|---|---|
| Instruct on all adjustments for projecting a quality picture. | Have students adjust and set up picture with correct aspect ratio, contrast, and brightness. |

**Equipment Needed**

Schmidt television projection system
Motion picture screen

First Year



Component 2

DRAFTING

| | | |
|---|---|---|
| Unit I | Basic Drafting | 30 hours |
| Unit II | Lettering and Types | 24 hours |
| Unit III | Charts and Graphs | 16 hours |
| Unit IV | Technical Illustration | 40 hours |
| | | 110 hours |

## Component 2 – DRAFTING

### Unit I – Basic Drafting

(30 hours)

**Specific Objectives**

The student will demonstrate beginning competency in basic drafting as follows:

1. Produce simple mechanical drawings involving orthographic and isometric projections.
2. Construct various geometric figures according to drafting standards.
3. Letter drawings, using basic lettering techniques.

**Basic Content**

1. Introduction to drafting
2. Typical equipment and tools
3. Preliminary procedures in drafting
4. Use of scales
5. Alphabet of lines
6. Dimensioning
7. Introduction to basic lettering (single-stroke gothic)
8. Multiview projection
9. Techniques of geometric construction
10. Pictorial drawings

**Suggested Learning Activities**

Note: Activities take place in the drafting room, supplemented by home study and practice.

| Instruction | Activities |
|---|---|
| 1. Introduction to drafting | |
| a. Drafting tools needed and why<br>b. Personal tools, materials, and equipment needed<br>c. Overview of unit<br>d. Unit objective defined<br>e. Brief history of pictorial illustrations<br>f. Value of illustrations as a means of communication<br>g. The role of drafting in educational and industrial communications<br>h. Significant landmarks in graphic communication (e.g., works of DaVinci, Descartes, Wright, significant contempories) | (Lecture only – no student activities) |

2. Typical equipment and basic tools – overview of items common to drafting situation

a. Drafting board and table
b. Drafting machines, T-squares, parallel edges, triangles, scales, protractors, templates, and erasing devices.

The student will examine and try out drafting equipment, including: drafting machines, parallel edges, triangles, irregular curves, scales, templates, pencils, paper, pens, ink, paper types, drafting tape, and cleaning equipment.

c. Types of personal tools:
   - Drafting pencils; pointing
   - T-squares
   - Triangles
   - Compass and dividers
   - French curves

d. Technical pens
   - Types and brands
   - Parts and their functions
   - Care of pens

e. Types of duplication machines:
   - Diazo – moist prints
   - Diazo – dry process
   - Thermofax process
   - Verifax process
   - Xerography
   - Photographic contact prints
   - Microfilm

3. Preliminary procedures in drafting

a. Placement of drawing surface on the drawing board

b. Provision for border and title block

The student will lay out various borders and title blocks, using scale for measurement.

c. Drawing the following lines:
   (1) Horizontal
   (2) Vertical
   (3) Guidelines for lettering

The student will develop technique in the use of tools to draw various lines.

d. Drawing circles and curves

The student will practice using the compass and French curves until he/she attains some facility with them.

e. Preliminary use of scales for making measurements.

4. Use of the scale

    a. Scale technique
    b. Mechanical engineer's scale
    c. Architect's scale
    d. Civil engineer's scale
    e. Metric

The theory of scales and making measurements should be reinforced in every drawing lesson. Exercises should include making drawings to various scales and sizes, i.e., ½ scale, 2x scale, 10x scale, ¼ scale, etc.

5. Alphabet of lines

    a. Alphabet of lines demonstrated on chalkboard
    b. Meaning of the following lines to be emphasized:
        (1) Visible line
        (2) Hidden line
        (3) Section line
        (4) Center line
        (5) Dimension and extension lines
        (6) Cutting-plane lines or viewing-plane lines
        (7) Various break lines
        (8) Phantom line

Student will develop proper line technique, including coding and width, by repeatedly drawing all of the lines indicated.

6. Placement and methods of dimensioning

    a. Off-view
    b. On-view
    c. Alinement system
    d. Unidirectional system

After preliminary practice in following the procedures discussed in the lecture, the student will properly dimension all drawings assigned under topic 8, "Multiview Projection."

7. Introduction to basic lettering (single-stroke gothic)

    a. Use of guidelines
        (1) Horizontal
        (2) Vertical
        (3) Inclined
    b. Characteristics of good lettering
        (1) Consistency of style (gothic)
        (2) Uniformity
        (3) Stability
    c. Variations
        (1) Condensed
        (2) Extended

The student will practice the following lettering techniques:

    a. Upper-case vertical
    b. Upper-case inclined
    c. Lower-case vertical
    d. Lower-case inclined

8. Multiview (orthographic) projection

   a. Explanation of the three planes
      (1) Frontal plane
      (2) Horizontal plane
      (3) Profile plane

      Instruction should include visual aids and models to clarify the concepts of projection.

   b. Theory of projection
      (1) Relationship of views to fold lines
      (2) Conventional placement of views
      (3) Alternate positions of view
      (4) Partial-view location
      (5) Removed-view location
      (6) First angle projection
      (7) Third angle projection

      Students will make two-view drawings of 4 or 5 objects which require only two views. Drawings should vary from easy to complex.

      Student will make three-view drawings of 4 or 5 objects that require three views. Drawings should vary from easy to complex. The student will dimension all drawings assigned under this topic.

   c. Lines
      (1) Visible lines
      (2) Invisible lines
      (3) Center lines
      (4) Lines produced by the intersection of two surfaces
      (5) Omission of line at the intersection of two surfaces

9. Techniques of geometric construction

   a. Bisecting arcs, lines, and angles
      (1) Compass and triangle
      (2) Triangle and straight edge

      The student will practice geometric construction techniques, using the indicated tools. The practice will include one or more problems involving each type of construction listed and using each technique mentioned.

   b. Parallel and perpendicular lines
      (1) Compass and straight edge
      (2) Straight edge and triangle
      (3) Drafting machine

   c. Dividing a line into equal parts
      (1) Conventional methods
      (2) Method preferred by draftsman

   d. Constructing regular polygons
      (1) Conventional methods
      (2) Method preferred by draftsman

   e. Tangents
      (1) A circle tangent to a line at a given point
      (2) A tangent to a circle through a given point

(3) One tangent to two circles
(4) An arc tangent to a line or arc through a point
(5) An arc tangent to two lines at right angles
(6) An arc tangent to two arcs

f. Constructing ellipses
(1) Approximate ellipse
(2) Ellipse template
(3) Concentric-circle method
(4) Axis and foci method
(5) Trammel method

The student will construct five ellipses, one by each method listed.

10. Pictorial drawing – Axonometric projection

a. Isometric projection
(1) The isometric scale
(2) Isometric drawing of normal surfaces
(3) Oblique surfaces in isometric
(4) Other positions of the isometric axes
(5) Box construction
(6) Ellipses in isometric
(7) Isometric dimensioning

The student will draw isometric projection drawings of the 8 or 10 objects presented under topic 8.

b. Oblique
(1) Cavalier
(2) Cabinet

**Equipment Needed**

Drafting room, quiet, well-lighted with chalkboards and bulletin boards
15 student stations, complete with two extra spaces for mechanical-drafting machines and stools

One light table
One blue-line print duplicator
One cutting table
One instructor's work table, including chair
One instructor's desk
Two metal storage cabinets
Two blueprint storage cabinets

**Supplies Needed**

One kit for each student, including: Drawing board (20x24); T-square; 6″ compass; 45° angle with 8″ sides, 30° x 60° triangle (10″ long side); triangular architect's scale and flat mechanical engineer's scale; irregular curve, protractor; mechanical pencils, HB, F, 2H, and 4H to 6H leads, or drawing pencils; pencil eraser, erasing shield, artgum or other cleaning eraser; drafting tape; draftsman's stapler; pen staff, pen points.

## Unit II – Lettering and Types

(24 hours)

**Specific Objectives**

The student will demonstrate abilities to work with lettering and type as follows:

1. Produce freehand lettering in accordance with ASA standards.
2. Produce lettering with the aid of mechanical devices in accordance with ASA standards.
3. Produce art-type lettering, using various art-form techniques.
4. Develop a personal style of lettering

**Basic Content**

1. Freehand lettering
   a. Brief overview of the printing art
   b. Vertical lettering
   c. Inking methods
   d. Architectural lettering
   e. Inclined lettering
   f. Different styles
   g. Layout of lettering
2. Mechanical-aid lettering
   a. Leroy lettering guides and their use
   b. Leroy techniques
   c. Wrico lettering
   d. Inking methods
   e. Layout of mechanical lettering
3. Application of art type and other forms of cold type
   a. Various methods and types available
   b. Application of transfer types
   c. Varigraph headwriter
   d. I.B.M. Selectric Composer
   e. Techniques of applying cold type
4. Developing a personal style of lettering
5. Portfolio

**Suggested Learning Activities**

| Instruction | Activities |
|---|---|
| 1. Freehand lettering | |
| a. Brief overview of the printing art<br>(1) Printing – its relationship to lettering<br>(2) Single-stroke gothic<br>(3) Lettering on engineering drawings<br>(4) Lettering on architectural drawings<br>(5) Lettering on artwork<br>(6) Advertising-media lettering<br>(7) Instructional-media lettering<br>(8) Transfer process of lettering<br>(9) Photographic methods of producing lettering | Materials Needed: A-Size vellum (8½"x11") drawing paper: B-size vellum (11"x17"); illustration board; Speedball lettering handbook. |
| b. Vertical lettering (single-stroke gothic)<br>(1) Guidelines (horizontal and vertical)<br>(2) Guideline devices<br>(3) Lettering styles<br>(4) Lettering stroke<br>(5) Proportions of letters and numerals<br>(6) Letter stability<br>(7) Spacing of letters<br>(8) Spacing of words, sentences and lines<br>(9) Height of letters and numerals<br>(10) Pencils for lettering<br>(11) Centering methods<br>(12) Upper case<br>(13) Lower case<br>(14) Letter standardization | The student will--<br>1. Draw in guidelines (horizontal and vertical) and fill an A-size sheet using 1/8" vertical lower-case letters. Use pencil.<br>2. Draw in guidelines (horizontal and vertical) and fill an A-size sheet with the alphabet, using 1/8" vertical capital letters. Continue using pencil.<br>3. Draw in guidelines (horizontal and vertical) and fill an A-size sheet using 1/8" vertical numerals.<br>4. Repeat problems 1 to 3 except that letters and numerals shall be ¼" high.<br>5. Ink the above projects with a #1 technical pen after getting instructor's approval.<br>6. The students will letter a few paragraphs of an appropriate subject, e.g., "Function of a Drawing," centered on an A-size sheet using 1/8" high capitals. Use pencil first and then ink.<br>7. Same as problem 5 except student will use upper and lower case, centered on an A-size sheet. |

c. Inking methods
   (1) Technical pens
   (2) Speedball

8. Given data in chart form from a trade journal, the student will transfer the chart to B-size vellum, proportioning the chart to suit the paper size.

d. Architectural lettering methods
   (1) The lettering style
   (2) The lettering stroke
   (3) Proportions of letters and numerals
   (4) Spacing words, sentences, and lines – balance
   (5) Height of lettering and numerals

9. Repeat lessons 1 to 5, except use architectural lettering methods. Use student's choice of pen.

e. Inclined-lettering methods

   (1) Letter standardization
   (2) The lettering style
   (3) The lettering stroke
   (4) The importance of inclined guidelines and methods of producing them.
   (5) Angle of inclination
   (6) Proportion of letters and numerals
   (7) Spacing words, sentences, and lines
   (8) Height of lettering and numerals
   (9) Centering
   (10) Upper case
   (11) Lower case

10. Repeat lessons 1 to 8, except use inclined lettering methods. In each case, rough in the letters in pencil before inking. Use a variety of pens.

f. Different freehand lettering styles

   (1) Extended style
   (2) Condensed style
   (3) Light
   (4) Medium
   (5) Bold
   (6) Open
   (7) Bold condensed

11. Same as 1 to 8, except students should practice the different freehand styles.

g. Layout of lettering

(1) Importance of a thumbnail sketch
(2) The rough layout
(3) Techniques of centering lines, sentences, and words
(4) Harmony of lettering
(5) Balance of lettering
  (a) Changing spacing to achieve balance
  (b) Effect obtained by non-centering
(6) Proportion

12. Student will lay out a sign or letter an illustration in pencil on a piece of illustration board, practicing all the points listed. After instructor's critique of pencil layout, student will ink the drawing. Repeat this project a minimum of 5 times, using different styles and sizes of pens.

13. With the Speedball lettering book, the student will practice using all the Speedball pens in the various Speedball lettering styles.

14. The student will lay out and design a poster, using all Speedball lettering and artwork. Prior to inking, student will rough-in a pencil copy and secure instructor's criticisms before final inking.

2. Mechanical aids to lettering

a. Leroy lettering guides and their use

(1) Vertical lettering
(2) Inclined lettering
(3) Leroy pencil
(4) Leroy pens
  (a) Use
  (b) Care of

b. Leroy techniques

(1) Spacing of letters and words
(2) Centering Leroy
(3) Non-standard scribers and Leroy guides
  (a) Modern Roman
  (b) Extra-large guides and their use

c. Wrico lettering guides and their use (if available)

(1) Pencil method
(2) Inking methods

d. Inking methods

(1) Care and use of Leroy pens
(2) Care and use of Wrico pens

Materials needed: Leroy lettering set and Wrico set if available, A-size vellum, B-size vellum, illustration board.
The student will --

1. Given data in chart form from a trade journal, the student will lay out the chart, using the appropriate Leroy guides for lettering in pencil. After instructor's critique of pencil copy, student will ink the pencil copy, using Leroy lettering. Repeat the above problem 5 times, including charts and signs.

2. Same as problem 1 except use Wrico if available.

3. Lay out several signs or titles on illustration board, using the 1- and 2-inch-high Leroy guides.

4. Same as 3 except use the different styles of Leroy guides.

e. Layout of mechanical lettering
(1) Layout techniques
(2) Centering methods
(3) Balance of lettering
(4) Estimating length of words and sentences
(5) Spacing between words, sentences, and lines
(6) Vertical alinement of lists and sentences
(7) Sign and poster layout

Materials needed: Poster board, speedball pens, Leroy lettering guides.

The student will --

1. Lay out a poster which may be used for instructional purposes, e.g., shop safety, metric conversion, etc. Layout will be roughed in with pencil, and after instructor's check, student will ink it in, using speedball and Leroy where applicable.

(8) Instructional-media layout
(a) For overhead projectors
(b) For 35mm slides
(c) For opaque projector

2. On A-size vellum, make master for overhead projector. Project can be chart, graph, or any instructional subject.

3. Same as problem 2 except master will be for 35mm slide.

(9) Enlarging and reducing of letters by photographic methods.

4. Student will design his/her own style of lettering. The student will lay out the lettering for a letterhead at least four times up and ink it in on a suitable drawing surface. Have printshop produce a reduced, actual-size positive for student.

5. Same as 4, except that student will do lettering actual size. Have printshop enlarge 2 times up.

3. Application of art type and other forms of cold type

Materials needed: Various styles of cold type necessary for paste-up problems, including : Letraset or similar, photostats, copy from keyboard machine, Varigraph Headwriter (if available); poster or illustration board, Speedball pens, rubber cement.

a. Various methods and types
(1) Prestype, Letraset, and other brands of transfer types
(2) Varigraph Headwriter (photographic)
(3) Keyboard text-on-paper machine
(a) Varityper
(b) Justowriter
(c) I.B.M. Executive typewriter
(d) I.B.M. Selectric

The student will --

1. On an 8½"x11" poster board, layout a chart, graph, or poster for instructional purpose. Student will use Letraset, photostats, and Speedball pens for special effects.

b. Application of transfer types

(1) Technique of applying transfer letters
(2) Use of cold-type processes in media production
    (a) Layout, centering, balance
    (b) Tips on application

c. The Varigraph Headwriter (if available)

(1) Styles and sizes available in 14-point to 72-point in the following styles:
    (a) Roman
    (b) Italic
    (c) Condensed or expanded

(2) Use and applications

d. I.B.M. Selectric Composer

(1) Type faces available
(2) Tip on using

e. Techniques of applying cold type

(1) Paste-up methods
    (a) Waxing
    (b) Rubber cement
(2) Centering and balance
(3) Tips on application of cold type

2. Same as above except poster-board size will now be at least 18"x24" and student is permitted to use any of the above materials to produce the poster. Poster should be finished for reproduction.

3. Practice the above project several times, using various forms of cold type.

4. Students will do titles about 1"–1½" high for movies and TV shows, using all the types and methods available.

5. If Varigraph Headwriter is available student will use it to produce at least 5 projects, including titles, posters, and graphs.

4. Developing a personal style of lettering

The instructor will assign additional projects at this time which student will execute in his/her personal style.

5. Portfolio

The student will start a portfolio of his/her best work for later use in seeking a job.

**Supplies Needed**

Five complete Leroy sets

Five sets technical pens

One set Wrico lettering guides

Five sets of Speedball pens

Various styles of lettering guides for Leroy scribers. Suggested guides are as follows:
- All Gothic guides, including some extra large guides
- Old English
- Script
- Shadow

20 steel erasers

Various brands of transfer-type lettering:
- Approximately 300 sheets, in all sizes and styles

Varigraph Headwriter and composition table with all guides

20 Ames lettering devices

Access to special typewriters - Varityper, Justowriter, IBM Executive, IBM Selectric, IBM Selectric Composer, etc.

## Unit III – Charts and Graphs

(16 hours)

**Specific Objectives**

The student will demonstrate effective ability to present data graphically by choosing the most appropriate type of chart or graph for the material and executing it.

**Basic Content**

1. Introduction
2. Line graphs
3. Column or bar charts
4. Pie charts and variations
5. Flow charts
6. Organizational charts
7. Use of color in chart and graph presentations
8. Selecting the most appropriate chart or graph for the data and purpose

**Suggested Learning Activities**

| Instruction | Activities |
|---|---|
| 1. Introduction | Lecture and student discussion on all points. |
| a. Importance of graphical representation<br>b. Classification of graphs<br>c. Applications<br>(1) Technical applications<br>(2) Advertising and general applications<br>d. Titles and notation<br>e. Standards for graphic representation<br>f. Choosing the particular type of graph<br>g. Scaling the graph<br>h. Misleading graphs<br>(1) Faulty choice of scales<br>(2) Bar graphs that don't start at zero<br>(3) Pictorial graphs where area increases by a factor of 4 when height is doubled. | Materials needed: graph paper, 8½"x11" 4x4 divisions per inch.<br><br>Given suitable data for single-line graphs, the student will transform the above data into simple single-line graphs, observing the standards of graphic presentation, choosing appropriate scales and titles. The graphs may be drawn with instruments or sketched.<br><br>Students should experiment with different scales, keys, and line presentations for the same data and note the effect.<br><br>The above lesson should be repeated at least 5 times with different data. |
| 2. Line graphs | Materials needed: rectangular-coordinate graph paper to the following scales:<br>20x20 per inch<br>10x10 per inch<br>4x4 per inch<br>Also various transparent grids if available |
| a. Rectangular-coordinate line graphs | |
| (1) Advantages and disadvantages | |

(2) Classification of line graphs

(a) Mathematical
(b) Time-series charts
(c) Engineering graphs

(3) Design and layout of rectangular-coordinate line graphs

(a) Use of grids under transparent paper
(b) Printed and prepared coordinate paper
(c) Scales and scale designations
(d) Graph titles and keys

Given at least 5 sets of data suitable for graphing, the student will transform the data into line-graphs as follows:

1. Determine the variable for each axis.
2. Choose the appropriate scales.
3. Label unit values along the axes.
4. Plot each point accurately.
5. Draw and identify curves by names or symbols or a key.

(4) Use of pressure-sensitive line tapes in place of ink in special cases, particularly for large charts.

After the student has completed a pencil copy and instructor has reviewed it for format and accuracy of curves, the student will ink the pencil copy.

Some of above graphs should be constructed on rectangular-coordinate paper and others on a commercially prepared grid under transparent paper or vellum. Emphasis should be placed upon drawing time-series charts and engineering graphs. Instruction should stress scale, format, and keys.

Given a set of data, student will convert the data to percent increase and decrease, and plot the data on a large chart suitable for exhibit, using pressure-sensitive line tapes.

b. Logarithmic-coordinate

c. Nomographs

The students should be introduced to these types of graphs briefly, but no student activities need be included.

3. Column or bar charts

a. Uses of bar charts

b. Design and layout of bar charts

(1) Scale
(2) Proportion

c. Use of shading and cross-hatching to clarify data.

Materials needed: 11"x17" vellum

Given appropriate sets of data, the student will make bar or column charts as follows:

1. Simple column chart with a minimum of four items of data.

2. Semi-complex column chart with three or more related pairs of data.

| | |
|---|---|
| d. Precautions against misleading bar charts | 3. Complex column chart with a minimum of 11 items.<br><br>4. Semi-complex bar graph with 6 related items of data employing pictorial symbols, composed to form bars. Graphs should be laid out in pencil and should be inked only after securing the instructor's consent.<br><br>5. Column chart with a minimum of 5 items showing both plus and minus deviations on same graph, using pressure-sensitive tapes. |
| 4. Pie charts | Materials needed: 11"x17" vellum. |
| a. Uses of pie charts – a good way to show:<br><br>(1) Percentage of a whole entity<br>(2) The general picture, for a given period of time<br>(3) A comparison of percentages at two different times | Given appropriate data, the student will make pie charts as follows:<br><br>1. Represent data on a percent basis for a minimum of 5 divisions of the whole.<br><br>2. Represent data suitable for a pie chart with at least 8 divisions. |
| b. Design and layout of pie charts<br><br>c. Converting the values to angles<br><br>d. Plotting the angles | 3. Gather data on their family budget and make a chart, i.e., food, shelter, medical, etc.<br><br>Students should demonstrate various techniques in showing sectors of the pie, such as shading, coloring, cross-hatching, etc. Pie charts should be laid out in pencil, and inked only after securing the instructor's consent. |
| e. Variations on pie charts, e.g., dollar bill, factory building, or other pictorial representation divided into parts. | 4. The student will think up a type of data suitable for some variation of a pie chart, draw up a hypothetical set of figures, and make the chart. |
| 5. Flow charts | Materials needed: 11"x17" vellum. |
| a. Primary function – to show a flow process as in<br><br>(1) Electronic circuits<br>(2) Hydraulic circuits<br>(3) Manufacturing processes | Given appropriate data, the student will construct flow charts as follows:<br><br>1. Show electron flow and current flow in a simple solid-state circuit. Draw a schematic flow chart. |
| b. Schematic flow charts | 2. Show liquid flow in a simple hydraulic accumulator system. Draw a block-diagram flow chart. |
| c. Block-diagram flow charts | |
| d. Symbolic flow charts | |

3. Collect information showing the various steps to manufacture an item of goods. Draw a symbolic flow chart of the process.

4. Same as 3 except have student draw a block-diagram flow chart.

Flow charts should be laid out in pencil and inked only after securing the instructor's consent.

6. Organizational charts

   a. Purpose – to clarify relationships between entities:

      (1) Line and staff organizations in small companies
      (2) Line and staff organizations in large companies

   b. Layout of an organizational chart

      (1) Scale
      (2) Format size
      (3) Reproduction consideration

Material needed: 11"x17" vellum and illustration board.

1. The student will research the organizational structure of his/her own city government and construct an organizational chart for quantity reproduction.

2. The student will research trade journals for a line-staff organization of a company employing 1,000 or less, showing the organizational structure. The student will either redraw or redesign the organizational chart to produce one that might be found in a boardroom.

3. Same as above except a line and staff organization of a company employing 10,000 or more. Chart should be for quantity reproduction.

7. Use of color in chart and graph presentations.

   a. Importance of color as an aid to clarity.

   b. Use of color in presentation of data

      (1) Related colors for related items
      (2) Complementary or contrasting colors for unrelated items

   c. Working with transfer-acetate sheets on charts and graphs

   d. Working with pressure-sensitive colored tapes.

Materials needed: Various colors of transfer acetates, Magic Marker color pens, tempera or equivalent, and color sheets and tapes.

1. The student will draw several column or bar charts, using the various coloring materials above to represent the data. Instructor should choose the most appropriate problems.

2. The student will draw several multiple-data line graphs, using color materials to represent the different sets of data. Instructor should choose the most appropriate problems.

3. The student will draw several pie charts, using color materials to represent the values. Instructor should choose the most appropriate problems.

| | |
|---|---|
| 8. Selecting the most appropriate chart or graph | The instructor will present at least 10 problems involving the graphical presentation of data. Without actually drawing the graphs, the student will indicate for each problem:<br><br>1. The most appropriate type of chart or graph;<br>2. The scale to be used;<br>3. Recommendations for color or shading if appropriate.<br><br>If time permits, the student will draw and finish the graphs after getting the instructor's consent. |

**Supplies Needed**

Same as those listed in Unit I plus the following items:

Graph paper: 20x20 divisions per inch on 8½"x11" sheets
x10 divisions per inch on 8½"x11" sheets
x4 divisions per inch on 8½"x11" sheets

Colored acetate contact sheets of various colors.

Colored pressure-sensitive tapes

Colored soft-tipped pens

Illustration board

## Unit IV – Technical Illustration

(40 hours)

**Specific Objectives**

The student will display abilities in technical illustration as follows:

1. Draw illustrations from models and photographs.
2. Draw illustrations using isometric projections, dimetric projections, and perspective.
3. Draw illustrations using inking, shading, and air-brush techniques.
4. Prepare preliminary freehand sketches.
5. Prepare technical illustrations for reproduction.

**Basic Content**

1. Isometric projection drawing
2. Perspective drawing
3. Shading techniques
4. The dimetric system of pictorial drawing
5. Finished illustration – from sketching to inking
6. Introduction to airbrush rendering in technical illustration
7. Mounting and presentation of drawings
8. Cleanup of technical illustrations for reproduction

**Suggested Learning Activities**

| Instruction | Activities |
|---|---|
| 1. Isometric projection drawing<br>a. Drawing the isometric cube<br>b. Measuring in isometric<br>c. Drawing isometric lines<br>d. Drawing non-isometric lines<br>e. Reference lines and points<br>f. Line and plane portion in isometric<br>g. Drawing various geometric objects<br>h. Drawing ellipses without guides<br>i. Drawing ellipses with guides | Materials needed: 11x17 and 17x22 vellum, students kits, illustration board.<br>1. The student will make isometric drawings of simple geometric objects or blocks with straight or recessed surfaces.<br>Both objects and photographs of objects should be used.<br>2. Same as 1 except use different isometric axes.<br>3. Student will make isometric drawing of geometric objects or blocks with inclined surfaces, curved surfaces, and holes. Photographs should be used as well as objects.<br>4. Student will make isometric drawings of spherical and circular objects with holes on their outer surfaces. |

5. Same as 3 and 4 except use different isometric axes.

6. Student will make isometric drawings of simple machine parts and assemblies.

The above drawings may be finished in either pencil or ink on vellum or illustration board. Shading will be added later.

2. Perspective drawing

Materials needed: 11x17 and 17x22 vellum, illustration board.

a. Introduction

(1) Perspective terminology

(2) Types of perspective

one-point
two-point
three-point

1. The students will make drawings of simple straight-sided geometric objects or blocks, including recessed surfaces, using the following perspective projections.

(a) one-point
(b) two-point
(c) three-point (optional)

b. The perspective ellipse

(1) With template
(2) Without template

2. Same as problem 1 except objects will be spherical and circular, with and without holes.

c. Mechanical aids to drawing perspective

(1) Various commercial perspective boards

(a) Anderson board
(b) Klok board

(2) Industry-designed grids

3. The student will construct perspective drawings of simple machine parts and assemblies, using whatever perspective projection method the student feels is appropriate.

The above drawings may be finished in either pencil or ink on vellum or illustration board. Shading will be added later. The student should use various methods to make the perspective, such as: industry-designed grids, Anderson board, etc.

3. Shading techniques

a. Assumed position of light source
b. Line technique
c. Stipple shading
d. Halftone blending
e. Highlighting

Under the teacher's direction, the student will practice the various techniques. The student will shade all of the drawings completed to date, using a variety of techniques.

4. The dimetric system of pictorial drawing

   a. Theory of the dimetric system

      (1) Description of the dimetric system
      (2) Usage and procedures

   b. The dimetric scale
      (1) Making dimetric measurements
      (2) Using foreshortened scales
      (3) Alternate dimetric scales

   c. Preferred dimetric projection

      (1) The preferred view
      (2) Alternate dimetric view
      (3) Selecting the proper view
      (4) Dimetric projection for basic views
      (5) Rotation for an alternate view

   d. Drawing the ellipse in dimetric

      (1) Major axis – true length
      (2) Constructing the ellipse
         (a) Parallelogram method
         (b) Trammel method
         (c) Template method

Materials needed: 11x17, 17x22 vellum and illustration board.

1. The student will construct dimetric drawings of simple straight-sided geometric objects or blocks, including recessed surfaces. Both objects and photographs should be used.

2. Same as problem 1 except student will use different dimetric axes of projection.

3. Same as problem 1 except objects will be spherical and circular, with and without holes.

4. Same as problems 1 and 3 except using different dimetric axes.

5. The students will construct simple drawings of machine parts and assemblies, using whatever axes are appropriate for that particular object or assembly.

The above drawings may be finished in either pencil or ink on vellum or illustration board. Shading techniques should be added later. The instructor should stress that the object should be studied in order to select those axes that best enable the draftsman to show the details of the object.

5. Finished illustration – Steps to take from sketching to inking

   a. Thumbnail sketch

   b. Quick, rough sketch

   c. Comprehensive layout

   d. Working pencil drawing

   e. Finished pencil drawing

   f. Finished drawing

   g. Shading (if applicable)

Materials needed: 22x34" vellum and illustration board approximately the same size.

1. The student will construct a finished illustration from an object or photograph, of moderate difficulty. The student will submit the following drawings prior to handing in the finished illustration:

   (1) Thumbnail sketch of each part
   (2) Rough sketch of parts in an exploded arrangement if applicable.

(3) Comprehensive layout in pencil
(4) Working pencil drawing of the composite
(5) Finished pencil drawing
(6) Finished inked drawing, including shading.

2. Repeat the above with two other projects.

6. Introduction to airbrush rendering in technical illustration

   a. Applications and uses

   b. Making and using the frisket

   c. Care and cleaning of airbrush

   d. Techniques

Materials needed: Illustration board, airbrush, ink, and paint suitable for use in airbrush.

1. The student will make a freehand practice drawing using the airbrush as follows: dots in sequence; horizontal lines; wavy lines; and diagonal lines, left and right. The student should practice all these exercises until they can be repeated without error.

2. The student will shade the following geometric shapes, using gray-scale technique on 8½"x11" finish Strathmore drawing paper. Use frisket.

   a. Rectangular solid
   b. Solid cone
   c. Solid cylinder
   d. Sphere

3. The student will make an airbrush rendering of a machine part by tracing the part out of a trade journal on a small sheet of 3-ply Strathmore or illustration board. Cut a frisket if necessary to complete the drawing by airbrushing.

7. Mounting and presentation of drawings

   a. Trimming and mounting

   b. Margin considerations

   c. Materials for mounting and flapping

      (a) Mount board
      (b) Acetate or cellophane
      (c) Strathmore paper
      (d) Rubber cement

Materials needed: Mount board, rubber cement, acetate, cutting board, and sharp razor blade.

The students will mount and flap the 3 illustrations which they constructed under topic 5. Method of mounting and flapping is left to the student.

8. Cleanup of technical illustrations for reproduction.

   a. Check for broken or weak lines
   b. Check for lines too close to one another that may close up when reduced.
   c. Remove
      (1) Excessive rubber cement
      (2) Masking tape and ink smear
   d. Final check prior to printing.

The student will check the 3 illustrations and clean them up where necessary.

**Facilities and Supplies Needed**

Air-brush unit with $CO_2$ bottle and all attachments

Additional supplies

8½"x11" Isometric sketch pad, 2 per student

18"x24" Sketch pads, 2 per student

20"x30" Illustration board

20"x30" Mounting board

20"x30" Clip board

Pencil and art sets – 1 per student

Layout pencils, 5 per student

Gray retouch paints, 6 in set, 3 per class

Black and white opaque paints

Spray fix

Water-color brushes

Rubber cement

Utility knife sets

Heavy-duty utility knives

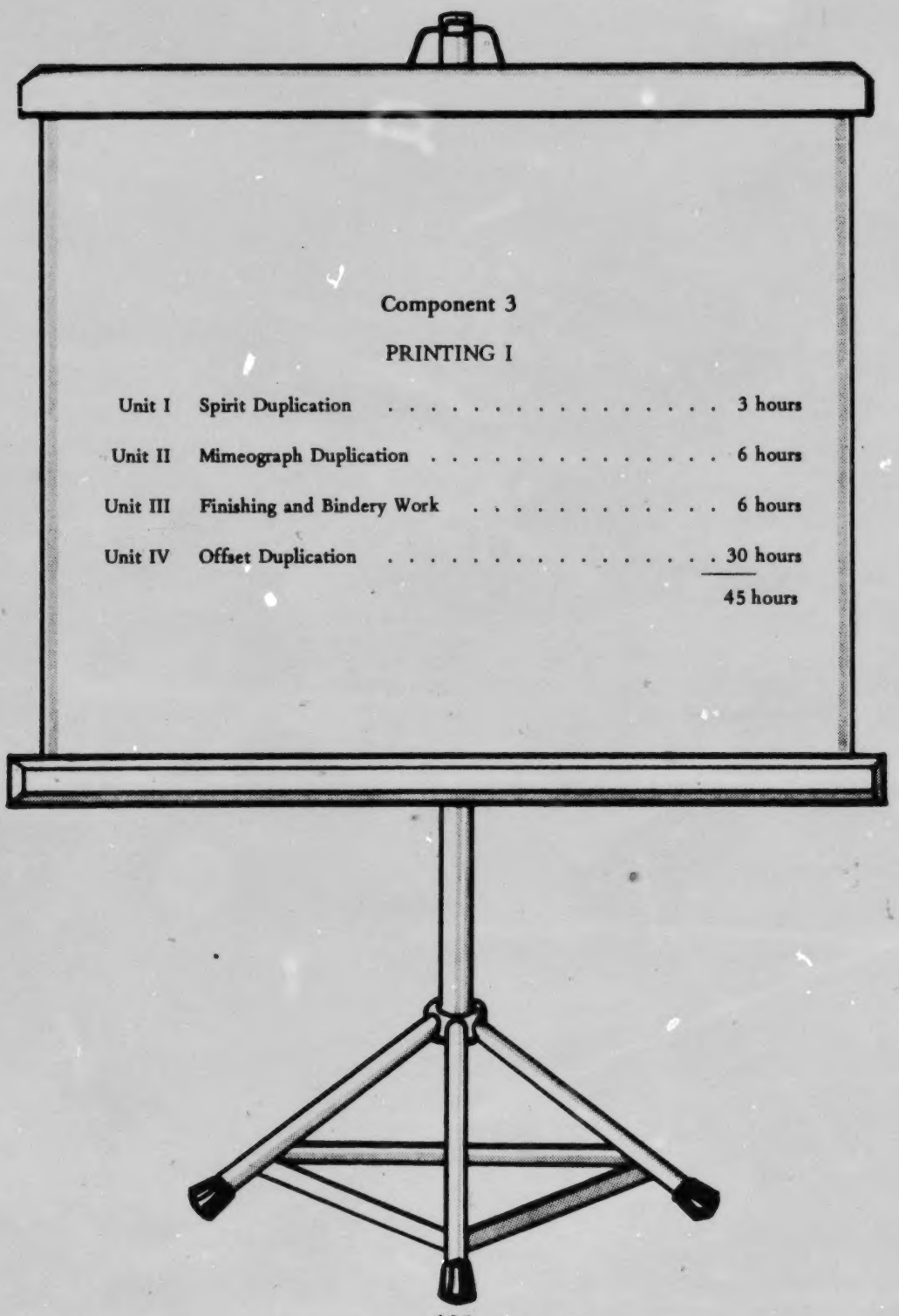
Photoscope enlarging projector or equivalent

Precision perspective grid sets

Graphic underlay guide

Isometric-dimetric projection charts, 1 per student

Templates: Nut and bolt; screw; all-degree ellipse set – 1 set per student



## Component 3

### PRINTING I

| | | |
|---|---|---|
| Unit I | Spirit Duplication | 3 hours |
| Unit II | Mimeograph Duplication | 6 hours |
| Unit III | Finishing and Bindery Work | 6 hours |
| Unit IV | Offset Duplication | 30 hours |
| | | 45 hours |

## Component 3 – Printing I

## Unit I – Spirit Duplication

(3 hours)

**Specific Objectives**

The student will demonstrate competence in working with spirit duplication processes as follows:

1. Prepare spirit masters for duplication
2. Set, operate, and run printed copy on the spirit duplicator machine.
3. Perform those adjustments frequently required by the spirit duplicator.

**Basic Content**

1. Stencil preparation
2. The spirit duplicator
3. Trouble-shooting

**Suggested Learning Activities**

Note: All activities to be demonstrated by instructor and performed by the student in the print shop

| Theory | Activities |
|---|---|
| 1. Stencil preparation | The student will prepare a stencil in the following manner:<br>a. Type copy on stencil<br>b. Draw or write on the stencil according to instructions<br>Using copying machine, the student will be able to copy on the stencil any pre-written or predrawn copy. |
| 2. The spirit duplicator<br>a. Advantages and limitations of machine<br>b. Operation of machine | The student will take prepared stencil and<br>a. Mount stencil on machine<br>b. Set up paper to print<br>c. Make inking adjustments<br>d. Check copy and make any final adjustment if needed<br>e. Take stencil off machine and clean up |

3. Trouble-shooting

Given poor copy or an out-of-adjustment machine, the student will trouble-shoot as follows:

a. Printing irregular – Check stencil

b. Copy too light – Increase ink

c. Picking up doubles – Adjust feeding mechanisms

d. Paper jamming – Adjust feeding mechanisms

**Facilities and Supplies Needed**

Spirit duplicator
Supplies
  Stencils
  Fluid
  Paper

## Unit II – Mimeograph Duplication

(6 hours)

**Specific Objectives**

The student will demonstrate competence in mimeograph duplication as follows:

1. Prepare stencils for mimeograph duplicator.
2. Set up machine and run off printed copy as specified in this unit.
3. Perform those adjustments frequently required by the mimeograph duplicator.

**Basic Content**

1. Stencil preparation
2. The mimeograph duplicator
3. Trouble-shooting

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Preparing stencil | |
| a. Cutting with typewriter and stylus | The student will prepare stencils: |
| b. Electronic cutting | a. Using typewriter and styluses |
| (1) Copy in pencil, ink, typing, screened photographs | b. On the electronic stencil cutter |
| (2) Determining factors – handcutting vs. electronic | |
| 2. The mimeograph duplicator | |
| a. Inking | The student will take prepared stencil and |
| b. Stencil mounting | a. Mount stencil on machine |
| c. Paper feed | b. Prepare paper to feed through machine |
| d. Final adjustments before printing | c. Ink stencil |
| e. Cleanup | d. Check copy and make any final adjustments if needed |
| | e. Take stencil off and clean machine |

| | |
|---|---|
| 3. Trouble-shooting | Given poor copy or a malfunctioning machine, the student will trouble-shoot as follows:<br>a. Copy too light – Increase ink<br>b. Picking up doubles – Adjust feeding mechanism<br>c. Paper jamming – Adjust feeding mechanism |

**Facilities and Supplies Needed**

Mimeo duplicator

Electronic stencil cutter

Supplies

Stencils
Inks
Styluses
Paper

## Unit III – Finishing and Bindery Work

(6 hours)

**Specific Objectives**

The student will demonstrate competence within this area of work as follows:

1. Cut paper effectively
2. Perform other operations involved in producing a finished product.

**Basic Content**

1. Cutting
2. Collating
3. Folding
4. Binding
   a. Stapling
   b. Hole punching
   c. Padding
   d. Plastic-ring binding
5. Wrapping and delivery

**Suggested Learning Activities**

| Theory | Activity |
|---|---|
| 1. Cutting with the paper cutter | |
| a. Safety features explained | The student will set up cutter and operate according to safety standards, cutting stock according to different specifications. |
| b. Cutting operation demonstrated | The student will recognize a dull knife and replace it. |
| 2. Collating | |
| a. Machine setup | The student will set up collating machine according to job instructions and collate. |
| b. Operation of collator | |
| 3. Folding with the folding machine | |
| a. Safety features | The student will set up folder and fold job according to instructions, at specified fold sizes. |
| b. Setup and adjustments | |
| 4. Binding | |
| a. Stapling with the power stapler | The student will set up stapling machine according to<br>(a) Flat staple<br>(b) Saddle staple<br>and proceed to operate machine. |

(1) Introduction to stapling

(2) Safety features

(3) Saddle and flat stapling

(4) Lubrication

The student will set up paper drill according to job specifications and proceed.

The student will recognize when the punch is dull and will sharpen it.

b. Hole punching with the paper drill

(1) Safety features

(2) Setup and adjustments for 1-, 2-, 3-hole punching

(3) Machine maintenance

c. Padding

(1) The padding rack

(2) Padding setup

(3) Stock padding

The student will set up padding rack, will jog stock, place in rack, and pad.

d. Plastic-ring binding

(1) Machine setup

(2) Binding dimensions

(3) Binding operations

The student will set up machine according to job specifications and proceed.

5. Wrapping and delivery

The student will take finished jobs, examine, O.K., and wrap.

**Facilities and Supplies Needed**

Paper cutter

Collator

Power stapler

Paper drill

Plastic-ring binding machine

Padding rack

Supplies

Padding cement
Plastic binders
Brushes
Kraft paper wire

## Unit IV – Offset Duplication

(30 hours)

**Specific Objectives**

The student will demonstrate ability to duplicate material by offset press as follows:

1. Set up and operate press and produce printed copy.
2. Operate the listed offset presses safely and with maximum efficiency.
3. Perform those adjustments peculiar to small offset presses such as Chief 17, Multilith 1250, and AB Dick 360.

**Basic Content**

1. Introduction to the offset press
2. Component systems
3. Normal maintenance
4. Operator safety
5. Paper selection
6. Operation of press

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Introduction to the offset press | The student will be introduced to the offset press through discussion and demonstration. |
| a. Principle of operation | |
| b. Advantages over other means of duplication | The student will be able to identify the major components of the press. |
| c. Types available; brands | The following activities encompass items 1 through 6. |
| d. Limitations of offset duplication | The student will lubricate machine. |
| e. Student handouts (see p. 114) | The student will place offset plate on press. |
| 2. Component systems | The student will prepare press for feeding stock.<br>a. Set air and vacuum<br>b. Set double-sheet detector<br>c. Set side guides |
| a. Inking | |
| (1) Types of inks<br>(2) Inking procedure<br>(3) Adjustments | The student will place ink in fountain and adjust for proper flow. |
| b. Dampening system | The student will prepare dampening system. |
| (1) Function<br>(2) Fountain solution<br>(3) Molleton rollers<br>(4) Aquamatic system<br>(5) Plate dampening | |

c. Cylinders

(1) Construction
(2) Blanket adjustments
(3) Importance of cleanliness

d. Plates

(1) Types
(a) aluminum
(b) Plastic photo-process
(c) Paper

(2) Installation

e. Feeding

(1) Air and vacuum
(2) Paper height
(3) Double-sheet detector
(4) Effects of temperature and humidity
(5) Trouble-shooting

3. Normal maintenance

a. Cleanliness
b. Lubrication

4. Operator safety precautions

5. Paper selection

a. Qualities needed for good offset work
b. Weights

6. Operation of press

a. Preparation of press
b. Running press without impressions
c. Trial printing
d. Adjustments
e. Printing operation
f. Press washup

7. Trouble-shooting

The student will run trial sheets through, make any final adjustments if needed, and print.

When job is completed, the student will take plate off machine, clean cylinders, and wash press.

### Trouble-Shooting

Presented with poor copy or a maladjusted machine, the student will trouble-shoot as follows:

| Problem | Cause |
|---|---|
| Printed copy gray, washed out | Not enough ink<br>Too much moisture |
| Copy too dark | Too much ink<br>Too much impression-to-blanket pressure |
| Double or blurred image | Loose blanket<br>Too much ink and fountain solution<br>Loose plate |
| Uneven printing | Incorrect Ink distribution<br>Glazed rollers<br>Dirty impression cylinder |
| Paper wrinkling | Too much moisture in system<br>Paper damp<br>Too much pressure between blanket and impression cylinder.<br>Register board not properly set. |
| Image breaks down while plate is running | Too much dampener from form-roller pressure<br>Too much ink pressure from ink form rollers<br>Fountain solution too strong<br>Too much plate-to-blanket pressure. |

| Problem | Cause |
| --- | --- |
| Streaking | Incorrect ink-form-roller pressure |
| | Incorrect dampener from form-roller pressure |
| | Incorrect plate-to-blanket pressure |
| | Loose blanket |

**Facilities and Supplies Needed**

Offset press

Paper cutter

Paper folder

Paper drill

Plastic binding machine

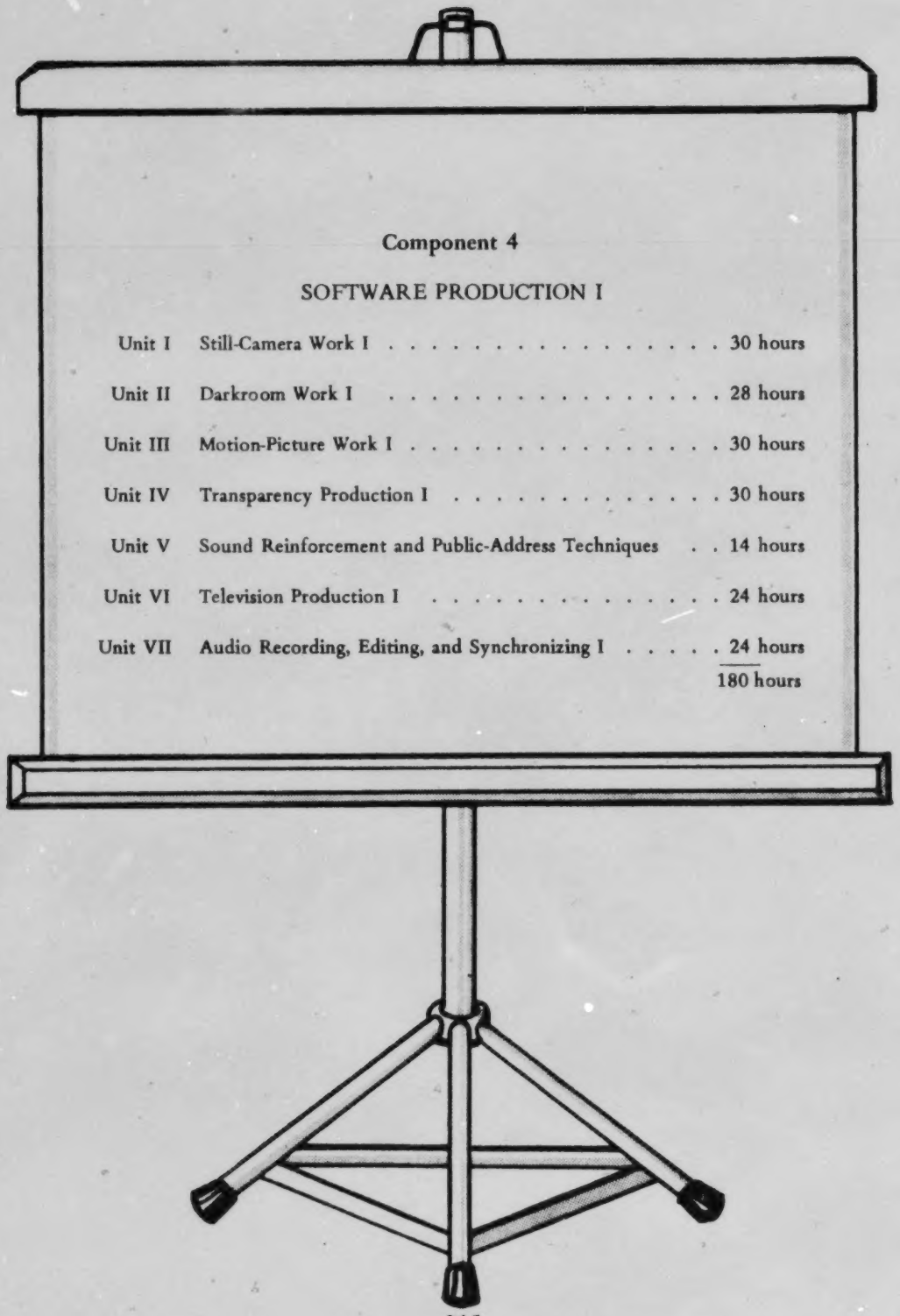
Padding rack

Supplies
- Plates
- Inks
- Cotton
- Ink knives
- Blanket and roller washup facilities
- Fountain concentrate
- Gum arabic

Student handouts

"Easy Does It" by 3M Company. An introduction to the art of offset duplication.

"3M Pressman's Guide"



## Component 4

## SOFTWARE PRODUCTION I

| | | |
|---|---|---|
| Unit I | Still-Camera Work I | 30 hours |
| Unit II | Darkroom Work I | 28 hours |
| Unit III | Motion-Picture Work I | 30 hours |
| Unit IV | Transparency Production I | 30 hours |
| Unit V | Sound Reinforcement and Public-Address Techniques | 14 hours |
| Unit VI | Television Production I | 24 hours |
| Unit VII | Audio Recording, Editing, and Synchronizing I | 24 hours |
| | | 180 hours |

## Component 4 – Software Production I

### Unit I – Still-Camera Work I

### (30 hours)

**Specific Objectives**

The student will demonstrate adequate skills in photography, as follows:

1. Identify and describe the functions of the basic camera parts.
2. Produce well-exposed photographs at widely varying combinations of aperture and shutter speeds in daylight.
3. Produce pictures under varied, pre-determined types of artificial lighting.
4. Perform the above two objectives with a variety of cameras.
5. Make 35mm slides of color pictures.
6. Duplicate slides individually and into filmstrip copy.
7. Produce good action-stopping sports pictures with different types of cameras.
8. Produce group photos of good technical quality, composition, and lighting.

**Basic Content**

1. Basic camera parts
2. Exposure
3. Artifical-light photography
4. Still-camera operation
5. Photographic filters
6. Basic copying
7. Macrophotograpy
8. Slide and filmstrip duplication
9. Sports photography
10. Group photos
11. Portfolio

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Basic camera parts – nomenclature and functions | |
| a. The lens | |
| b. Shutters | |
| c. Iris (diaphragm) | |
| d. Film-holding systems | |
| e. Viewing systems | |
| f. Exposure-determining systems | |
| g. Built-in accessories | |

2. Exposure

| | |
|---|---|
| a. Aperture, shutter speed, film sensitivity and their interrelationship | Using a Polaroid model 190 adjustable camera, the student will produce three well-exposed photographs at three widely varying combinations of aperture and shutter speeds (outside in daylight) |
| b. Determining exposure by trial and error, by film specification sheet, and by calculation | |
| c. Exposure meters | |
| (1) Extinction (historical)<br>(2) Photovoltaic (selenium)<br>(3) Cadmium sulfide<br>(4) Spot meters<br>(5) Built-in meters<br>(6) Reflected light measurement<br>(7) Incident light measurement<br>(8) Use of a gray card<br>(9) Problem situations<br>(a) Landscapes<br>(b) Dim-light situations and sunsets<br>(c) Beach and snow scenes<br>(10) Foot-candle meters | The student will learn to operate commonly used exposure meters. He/she will demonstrate competence by taking a series of 5 well-exposed color photographs under a wide variety of illumination levels in both natural and artificial light. The student will cycle through each meter and learn its operation. |

3. Artificial-light photography

| | |
|---|---|
| a. Flash and strobe<br>b. Flood lights<br>c. Existing-light photography<br>d. Night photography<br>e. Fill-in flash | The student will take three pictures under each type of artificial lighting. These will be mounted on worksheets, for analysis of strengths and weaknesses. Analysis will include both technical and artistic points. |

4. Still-camera operation

| | |
|---|---|
| a. 35mm rangefinder camera<br>b. 35mm rangefinder camera with automatic exposure control<br>c. 2¼ x 2¼ twin-lens reflex<br>d. 35mm single-lens reflex<br>e. 2¼ x 2¼ single-lens reflex<br>f. 4" x 5" press camera<br>g. 4" x 5" view camera | The student will cycle through each camera available from the Media Department. The student will take three pictures with each camera: one under sunlight, one with flash or flood, and one under existing light. Color film will be used in 35mm cameras and be developed by Kodak; black and white film will be used in all other cameras, and this film will be processed under carefully controlled conditions by second-year media-tech students or photo technician, and contact sheets made. The student will be given the resulting slides, negatives, and contact prints. He/she will analyze the results and retain them on worksheets and plastic slide sheets. |

5. Photographic filters

a. Color-balancing filters (85 series, etc.)

The student will use color-balancing filters to take pictures with the following combinations:

Daylight film – 3400°K lamps
Daylight film – 3600°K lamps
Type A film – sunlight, etc., etc.

b. Polarizing filters

(1) Elimination of glare

The student will take three sets of color slides of subjects lying in shallow water outside. One slide of each set will be taken without polarizing filter and one with a polarizing filter. The results of these efforts will demonstrate the student's competence in the use of polarizing filters for eliminating glare from non-metallic horizontal surfaces and an understanding of the photographic significance of Brewster's angle.

The student will take two sets of slides of objects located behind plate-glass windows and illuminated by floodlights. One slide of each set should be taken with filter on both camera and lamps. The resulting slides will show competence in the use of polarizing filters for eliminating reflected glare from glass surfaces.

(2) Sky darkening

The student will take 3 sets of slides outside, incorporating large sky areas with clouds. One slide of each set will be taken without filters and the second with a polarizing filter. The resulting slides should demonstrate the student's competence in using polarizing filters for darkening the sky in color pictures and emphasizing cloud formations.

c. Filters for tone modification in black and white photography

Using a press or view camera fitted with a polaroid back and mounted rigidly on a tripod, the student will photograph a scene incorporating a building, sky with clouds, and vegetation. He/she should make one color and one black and white photograph without filtration and one black and white photograph using each of the six filters in the set. The resulting photographs are to be mounted on a worksheet and the tone modifications caused by the filters indicated. This series of photographs should demonstrate the student's competence in the use of filters in black and white photography and his/her understanding of filter factors.

6. Basic copying

a. The Ektagraphic Visualmaker

Using the Ektagraphic Visualmaker, the student will produce two slides of color pictures selected from books or periodicals. One slide should be taken using each of the image sizes provided by this device.

b. The simple copy stand

(1) Close-up lenses

(2) Bellows and extension tubes

(3) Exposure compensation for long lens extensions

(4) Use of the lens-reversal ring

Using a simple copy stand with floodlights, a 35mm single-lens reflex and close-up lens set, the student will assemble the stand, mount the camera and lights, and take two pictures of each of three different sizes of original copy (approximately 2" x 3", 6" x 9", and 12" x 18".)

Using the same copy stand but with extension tubes or bellows in place of the close-up lenses, the student will take two pictures each of hardcopy art approximately 2" x 3" and 1" x 1½" in size. The student will calculate the necessary exposure increases on his worksheet and compare his calculated exposures with those indicated on the exposure calculator in the master photoguide.

7. Macrophotography

a. Field work

b. Use of reflectors

c. Fill in flash for close-up photography outside

Using a 35mm single-lens reflex, close-up lenses, macro lens, extension tubes, etc., the student will take 6 well-exposed macro pictures of nature objects (insects, leaves, flowers, etc.) Two pictures will be taken with direct sun illumination, two with the use of reflectors, and two with flash fill-in.

8. Slide and filmstrip duplication

a. Basic slide duplication with simple attachments

b. "Cropping" by copying

Using a 35mm SCR camera, bellows unit and slide holder, the student will make two copies of a good, well-exposed slide. One will be at 1:1 magnification, and the second will be at a higher magnification, using only a portion of the original slide.

9. Sports photography

a. Motion-stopping technique and timing

(1) Direction of motion and shutter-speed requirements

(2) The use of sports finders

(3) Panning

Using a press camera, a 35mm camera, and a 2¼" x 2¼" twin-lens reflex, the student will attend a school track meet and take both color and black and white photos of the various events, using all three camera types. The student will produce at least two pictures illustrating each of the following:

a. Point of least motion (pole vault)
b. Head-on shots (100 yd. dash)
c. Panning (any sprint event)
d. The finish (any sprint event)
e. The landing (long jump)
f. Diagonal motion (hurdles)

b. Indoor sports photography

(1) Use of electronic flash for stopping motion

(2) Equipment handling for mobility (Clothing, footware, and techniques)

Using 35mm and twin-lens reflex cameras, the student will cover a basketball game or wrestling match. He/she will produce 12 acceptable black and white photos demonstrating mastery of action-stopping flash technique.

10. Group photos

a. People-management in group photos

b. "To pose or not to pose?"

c. Backgrounds

d. People and things

e. Lighting for group photos

The student will take two photographs of groups of more than two but less than six people. One will be an on-location shot, and one a carefully controlled studio shot. Both should exhibit good technical q uality, good composition, and good lighting technique.

11. Portfolio

The student will compile a portfolio of his/her work in the still-photography field for use in seeking a job upon completion of the course.

**Equipment Needed – Still-Camera Work I**

The equipment needed for this component is listed in groups of similar items (or available from similar vendors) in the order that it will be needed. Equipment needed for a specific section that has been listed for a previous section *is not* repeated, thus avoiding duplication of items should this list be used for ordering purposes.

"Hoo-B-Optics" Lens Bench (from American Science Center or Edmund Scientific Co.)

Polaroid Film Holder (for 107–108 film) to fit press or view camera. This will also be used in later work. (One per three students)

Selection of simple lenses, diaphragms, polarizing filters, and other small items to be selected by the instructor when actual learning experiences are designed.

Whitney Hand Punch with Die Sets from 1/32" diameter to ½" diameter

Polaroid Model 195 Camera with Portrait Kit, Closeup Kit, and Flash Attachment (Minimum of one per two students)

Exposure Meters (one per class unless otherwise noted):

Weston Master VI

Gossen Super Pilot

Minolta Auto Spot 10
or
Honeywell 1°/21°

Gossen Luni-Pro with all attachments (One per 6 students)

General Electric foot-candle meter
or
Gossen Panalux foot-candle meter

Artificial Lighting Equipment (These items will also be used in later sections):

Set of 3 small movie lights with stands in attache carrying case (Smith-Victor or equivalent) (1 per 5 students)

Set of 3 medium-sized floodlights with transport case (Smith-Victor or equal) (2 per class)

Mini studio strobe outfit with flash meter and accessories (Bowens or equal) (3 per class)

Electronic flash meter (Gossen or equal) (2 per class)

Small manual, camera-mounted electronic flash units (1 per 5 students)

Medium-output electronic flash units with built-in and separate auto-exposure sensors (1 per 3 students)

35mm Rangefinder camera (1 per 10 students)

35mm Rangefinder camera with semi-automatic or repeatable automatic exposure control (Canon QL or equal) (1 per 10 students)

2¼ x 2¼ Twin-lens reflex camera (1 per 5 students)

35mm Single-lens reflex camera with a large assortment of lenses and other accessories (one per 2 students)

2¼ x 2¼ Single-lens reflex camera with 4 lenses (1 per class)

4" x 5" Press camera with accessories (2 per class)
or
4" x 5" View camera with full range of swings and tilts and 3 lenses (Kardon–B or equal) (1 per class)

Slide projector (1 for each 2 students)

Polaroid backs (4"x5") – one per each press and view camera

Set of 14 color-balancing filters, Wratten Filters Nos. 82, 82A, 82B, 82C, 81, 81A, 81B, 81C, 81D, 81EF, 80A, 80B, 85, 85B, in 52mm screw-in mounts with adapters and reducers to fit all SLR cameras used.

Small sets of five color-balancing filters sized to fit popular cameras. Set to include Wratten Nos. 85, 80A, 80B, 81A and 85B (one set for 5 students)

Polarizing filters in Rotating Mounts, sized to fit cameras available (1 filter per 2 students)

Polarizing screens with holding brackets to fit available floodlights (1 set of 2 for each 3 students)

Black-and-white filter set, sized and mounted to fit various cameras available. Set to include Wratten Nos. A, K-2, G, X-1, B, and C-5 (2 sets per class)

Ektagraphic Visualmaker (one per class)

Close-up lens sets, each set to consist of +1, +2, and +3 diopter close-up lenses with leather storage case. Set to be sized to fit each available SLR camera (one set per SLR camera available or one set per 2 students)

Bellows and extension-tube sets to fit available SLR cameras (one set per 3 students)

Lens reversal ring (one per SLR camera *make*)

Simple, knock-down copy stand with lighting assembly (2 per class)

Electronic flash units (a.c. operated) to mount on copy stand with custom-built mounting adapters (4 per class)

Slide Duplicating Devices to use in conjunction with bellows units above (one per available bellows)

Keystone or equal Stereopticon (one per class) or Sawyer Viewmaster

Refrigerator for storing films, etc.

## Unit II – Darkroom Work I

(28 hours)

**Specific Objectives**

The student will demonstrate satisfactory darkroom performance as follows:

1. Develop film, including under- and overexposed film.
2. Document film as directed.
3. Contact-print and enlarge negatives, using various materials.
4. Process and mount color slides

**Basic Content**

1. Film development
2. Contact printing and monochrome print papers
3. Basic enlarging and cropping
4. The reversal process
5. Slide mounting

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Film development | |
| a. Roll films | The student will take three rolls of monochrome 120 film, identical in every respect except for exposure. He/she will expose and process one roll normally. The student will expose one roll two stops overexposed, and process it to compensate. He/she will expose one roll two stops underexposed, and process it to compensate.<br><br>The student will develop monochrome films taken in previous exercises, using various developers and other chemicals. He/she will exhibit competence in properly documenting and filing the resulting negatives. |
| b. Sheet films | The student will expose a minimum of 6 sheets of film in a 4" x 5" or larger press or view camera. The student will process this film to obtain good-quality negatives. (This should be done concurrently with section 9 of Unit I if timing permits.) |

2. Contact printing and monochrome print papers and processing

a. Paper selection

(1) Speeds
(2) Contrast
(3) Weights
(4) Surfaces
(5) Resin-treated papers

Using a well-exposed and properly processed 4" x 5" negative selected by the student and approved by the instructor, the student will produce a series of contact prints on various fixed-contrast print materials. The student will mount all prints on a worksheet and select the best print, based on both technical and artistic considerations.

b. Contact-printer types and operation

(1) Simple print frames
(2) Masks and bordered prints
(3) Professional contact printers

c. Drying and mounting

(1) Drying methods
(2) Print finishes
(3) Mounting techniques
(4) Laminating

The student will demonstrate his competence in print-finishing by producing both glossy- and matte-finish prints using: blotter rolls, ferro-type tins, simple "turn-over" dryers, and the motorized drum dryer.

The student will mount prints using photographic cement and dry mounting tissue. He/she will also mount a print for framing under glass.

The student will laminate a mounted photograph or printed material, using the dry mounting press. The finished piece will be flat and free of bubbles.

3. Basic enlarging and cropping technique

a. Determining proper exposure

b. Enlarging technique

c. Processing the enlargements

The student will use a negative that he/she has taken and processed to become familiar with the operation of a monochrome enlarger. The student will demonstrate competence in the following operations.

1. Negative carrier selection and loading
2. Use of the enlarging easel
3. Enlarger focusing adjustments and the use of focusing aids
4. Aperture manipulation and exposure timing

The student will make a good quality 8" x 10" enlargement of a section of one of his negatives.

4. The reversal process

| | |
|---|---|
| a. Basic reversal processing<br>b. The Ektachrome E-3 and E-4 processes<br>c. The GAF reversal process | The student will expose three rolls of 35mm film in a variety of situations: 1-Ektachrome film 6115 (Process F-3); 1-Ektachrome X film (Process F-4); 1-GAF. The student will process each roll of film in its associated chemistry. |
| d. Push-processing of reversal color materials. | The student will expose one roll of Ektachrome film at normal speed and one at a 2-stop underexposure. He/she will push-process the underexposed film to give a normal-density slide and will develop the other film normally. The student will then compare the results. |

5. Slide mounting – types, and the advantages and disadvantages of each

| | |
|---|---|
| a. The cardboard ready-mount<br>b. The plastic slide mount<br>c. The double-glass slide mount<br>d. The single-glass cemented mount | The student will take one roll of processed reversal film and mount the finished transparencies in four ways. |

**Equipment and Supplies Needed – Darkroom Work I**

Triple-beam centigram platform balance, 0 to 1000 gm. capacity (Ohaus or equivalent)

Bottles, brown glass with pouring lip and positive-seal plastic cap. Purchase in case lots from Erno (Phila.): 4-oz., 8-oz., 12-oz., 16-oz. and 32-oz. capacity.

Still, Barnstead Electric, capacity ½ gallon per hour (optional)

Thermometers, short-range stainless-steel dial-type (one per two students)

Initial supply of beakers, graduates, measuring spoons, funnels, large bulk-storage bottles, filters, stirring rods, film clips, etc.

Large film-drying cabinet

Selection of roll-film processing tanks with reels (Kindermann or equal) to accommodate 110, 126, 35mm, 120, 127, and 616 film (one assortment per case)

Large negative filing cabinet with drawers sized to accommodate 35mm, 120, 3¼" x 4½" and 4"x5" negatives

Sets of processing tanks, film hangers, and other small equipment for processing 4"x5", 5"x7", and 8"x10" film (one assortment per class)

Contact printer with adjustable masks capable of printing 8"x10" negatives

Selection of processing trays in sizes 5"x7" to 20"x24", print tongs, tray thermometers, etc.

20"x24" "Turnover" print dryer
or
Motorized drum dryer

Darkroom with wet and dry work areas, sodium-vapor safelight and revolving-light trapdoor or maze (Design dependent on class size and method of instruction).

Large mounting press with tacking iron

4" x 5" Monochrome condenser-enlarger, with tilting head and filter drawer complete with lenses and negative carriers (Beseler or equal) (one per 10 students)

Aerial image focusing device (Scopinet or equal) (one per enlarger)

Selection of adjustable and fixed enlarging easels

Enlarger timer (Gray Lab or electronic type) (one per enlarger)

Set of Polycontrast filters (one set per enlarger)

Film cutter

Thermal slide-binding press

Plastic slide-mounting press

## Unit III – Motion-Picture Work I

(30 hours)

**Specific Objectives**

Students will demonstrate adequate skills in motion-picture work as follows:

1. Define the essential elements in cinematography.
2. Effectively operate an 8mm motion picture camera as directed.
3. Plan, photograph, and edit an 8mm magnetic-sound, single-concept film.
4. Perform all steps essential to effective motion-picture taking, as specified within this unit.

**Basic Content**

1. The motion-picture camera
2. The motion-picture projector
3. Basic cinematography
4. Camera exposure systems
5. Filming with lights
6. Titling and animation techniques
7. Sound in motion pictures
8. Editing and laboratory special effects
9. Cartridge projectors

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. The motion-picture camera | |
| a. Basic camera construction<br>b. Camera operation | The student, using one of the motion picture cameras, will identify all of the working parts and be able to describe their function.<br><br>The student will learn to load and operate the controls of each of the 8mm cameras available. He/she will prove competence by making a series of 2-minute outside scenes, using the different cameras. The films will be evaluated for camera steadiness, exposure, focus, zoom operation, etc.<br><br>The student will demonstrate proper techniques in cleaning the lens, film gate, and interior of a motion picture camera. |

| | |
|---|---|
| c. Commonly used motion-picture sizes and formats<br>d. Motion-picture films, their selection and application. | The student, given a list of motion-picture shooting situations and existing conditions, will select suitable films for use in each application and support his/her selections. |
| 2. The motion-picture projector | |
| a. Projector operation | The student will familiarize himself with each of the motion picture projectors used in the school system. He will demonstrate his ability to properly operate each projector. |
| b. Projector care | The student will demonstrate proper technique in the following:<br>Lens cleaning<br>Gate cleaning<br>Lamp replacement |
| c. Presentation techniques | The student will present a motion picture to the class. He/she will demonstrate a mastery of proper presentation techniques. |
| 3. Basic cinematography | |
| a. Continuity<br>b. Variety<br>c. Camera-to-subject distances<br>d. Cutaways<br>e. Camera angles<br>f. Sequences<br>g. Composition<br>h. Pans, zooms, dolly shots | The student will demonstrate a knowledge of basic cinematographic techniques by producing a 6-minute super-8mm film using a multiplicity of techniques including:<br>Variety of scene lengths<br>Proper use of close, medium, and long-distance shots<br>Cutaways<br>Sequences<br>Camera-angle variety |
| 4. Camera exposure systems | The student will demonstrate an ability to operate the built-in exposure system in each available camera. He/she will set the exposure system properly for various films, lock it or set it for manual operation, and in the case of cameras with variable shutters, make necessary compensations. |
| 5. Filming with lights | |
| a. Photolamps for motion-picture work.<br>b. Working under television-studio lights (3200°K) | The student will make three film sequences demonstrating his mastery of motion-picture filming techniques under partially and completely controlled studio-lighting conditions. One film sequence will be taken in a shop situation, using blue photofloods for either prime light or as fill-in along with natural window light. |

c. Use of blue photofloods
   (1) As prime light (w/daylight film)
   (2) For fill-in

d. Typical lighting setups for studio and on-location filming

A second film sequence will be shot under strictly controlled studio-lighting conditions. This film will be the most carefully evaluated portion of the motion-picture section of the course, since this is the first time all production parameters will be under the complete control of the student.

The third film sequence will be a studio filming assigned by the instructor for use within a teaching situation.

6. Titling and animation techniques

a. The what and why of titles

b. Title design and composition

c. Title lettering
   (1) Hand-lettered
   (2) Printed
   (3) Wrico-lettered
   (4) LeRoy-lettered
   (5) Varigraph-lettered
   (6) 3-D letters
   (7) Hot-press lettering
   (8) Transfer lettering
   (9) The "found" title

The student will prepare and film a minimum of three title sequences as assigned by the instructor, utilizing a variety of lettering techniques and demonstrating a mastery of both the technical and artistic considerations covered in this area.

The student will prepare a title-and-credit sequence for his single-concept film produced in section 7. This sequence should be complementary in design to the subject matter of his film. The student will also prepare any necessary captions for insertion into the film.

d. Artwork preparation

   (1) Backgrounds and decoration
   (2) Domination or subordination of title elements
   (3) Variety
   (4) Rhythm
   (5) Using decorative elements
   (6) Title layout
   (7) Title card and artwork standards

e. Filming titles

   (1) Copy stands and lighting
   (2) Alining
   (3) Focusing
   (4) Superimposed titles

7. Sound in motion pictures

   a. Types of motion-picture sound

      (1) Magnetic and optical sound tracks
      (2) Single-system sound
      (3) Double-system sound
      (4) Projector-added sound

   b. Sync vs. non-sync sound

   c. Narration

   d. Music and sound effects

   e. Magnetic motion-picture sound

      (1) Magnetic sound recording
      (2) Equipment for magnetic sound
         (a) Cameras
         (b) The recording projector
         (c) Accessory audio equipment

The student will plan and photograph a magnetic-sound single-concept film. This film will demonstrate his/her cumulative knowledge of motion-picture techniques. Topic to be assigned by the instructor.

8. Editing and laboratory special effects

   a. The purpose of editing
   b. Editing equipment
   c. Simple editing
   d. Splicing techniques

The student will edit a previously made film to improve it technically and artistically. Additional footage may be shot as required.

9. Cartridge projectors

   a. The Technicolor film loop
   b. The Kodak cartridge
   c. The Fairchild Moviepak loop

The student will demonstrate an ability to load cartridges of three different types, using either films that he/she has produced or ones provided by his instructor. (Note: Internally produced films intended for training use within the school can be duplicated by an outside laboratory, and the duplicates loaded into cartridges.)

**Supplies and Equipment Needed – Motion-Picture Work I**

Super 8mm motion-picture cameras (one for each 3 students)
Suggested types:

Kodak Model XL-360 with 9–21mm zoom lens

Minolta Autopak-8 D-10 Super-8 Movie Camera, deluxe outfit with intervalometer, etc.

Bauer C-Royal-10 Super-8 with Trick Kit

Kodak Ekta-Sound 160 Movie Camera w/accessories

Kodak Supermatic 200 Camera

Bolex Macrozoom 8mm Movie Camera

Selection of motion-picture projectors

Kodak MSF-8 Super-8mm Projector

Bolex 16mm Magnetic Sound Recording Projector

Used 16mm carbon-arc projector

Technicolor Loop Projector (one per 5 students)

Kodak Cartridge Projector (Ektagraphic 120 or equal) (one per 5 students)

Fairchild Sound Loop Projector (one per 5 students)

Tripod with dolly (one per 3 students)

Tripod with fluid- or governor-controlled panhead (one per class)

Set of 3 3200°K photo lamps (medium size) in transportable carrying case (Smith-Victor or equal)

Standard photoflood reflectors with stands fitted with No. 2B and 4B blue photoflood lamps (Acme-Life Senior Litepak or equal) (min. of 5 sets per class)

A complete set of color balancing or color correction filters in 3"x3" gelatin squares (one per class) and in glass-threaded mounts.

Large selection of lettering equipment, including:

Leroy lettering set with reservoir pens– large (1 per 7 students)

Self-adhesive and pin-back 3 dimensional letters

Small (24"x36") tracing board (2 per class)

Large tracing or stripping table (one per class)

Varigraph lettering instrument with composing table

Varitype Headliner with extra wheels (one per class)

Varifont lettering machine and extra fonts

Wrico lettering sets (assortment of 4 per class)

Various size pieces of glass with edges taped

Assortment of audio equipment (See unit VII)

8mm Film-splicing blocks of different types (one per 3 students)

16mm Film-splicing blocks of different types (one per 5 students)

High-quality 8mm editor with sufficiently bright image to use in normal room light (one per 3 students)

High-quality 16mm viewer, (Moviscop or equal) (one per 5 students)

16mm Film rewinds to take 2000 ft. reels, each pair to be mounted on hardwood base, fitted with rubber legs and with routed cavities to take 16mm viewers and splicing blocks (internally fabricated) (one pair of mounted rewinds per 5 students)

Movieola Synchronizer with frame counter for A & B roll editing

NOTE: Equipment has not been specified for professional double-system sound editing. The techniques associated with this phase of motion-picture production are quite sophisticated, and the equipment quite expensive. It is suggested that, should double-system sound be taught, necessary equipment be rented for the period of time needed. As an alternate, used equipment could be purchased.

## UNIT IV – Transparency Production I

(30 hours)

**Specific Objectives**

The student will produce good-quality educational transparencies by the following processes:

a. Thermal

b. Diffusion transfer

c. Diazo

d. Color lift and spirit duplicator

The student will effectively use the overhead projector for three other uses as explained below.

**Basic Content**

1. Thermal transparencies
2. Diffusion-transfer transparencies
3. Diazo transparencies
4. Color-lift and spirit-duplicator types
5. Other uses for the overhead projector

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Thermal transparencies | |
| a. The thermal imaging process<br>b. Requirements for originals to be used in making thermal transparencies.<br>c. "Wash-off" thermal materials<br>d. Advantages and disadvantages of thermal materials | The student will run a minimum of 12 black-line thermal transparencies from commercially prepared originals. |
| 2. Diffusion-transfer transparencies | |
| a. The diffusion-transfer process<br>(1) The principle of reflex exposure<br>(2) The Kodax Verifax (obsolete)<br>(3) The AB Dick model 120<br>(4) The 3M 107 book copier | The student will produce and mount 5 transparencies from "found" originals provided by the instructor. The student will modify, mask, paste-up, or otherwise adapt this material as required by its end use. |
| b. Advantages and disadvantages of the diffusion-transfer process | |

3. Diazo transparencies

| | |
|---|---|
| a. The principles of the diazo process<br>b. Diazo printing equipment<br>c. Requirements for originals to be used in diazo reproduction<br>d. Advantages and disadvantages of the diazo process. | The student will process and mount a minimum of 5 multicolor diazo transparencies from commercially produced originals. |

4. Color-lift and spirit-duplicator produced transparencies

| | |
|---|---|
| a. Identifying printed materials suitable for "lifting"<br>b. Color-lifting processes | The student will produce two color-lift transparencies, one made through adhesive methods and one using thermal methods. These should exhibit good transparency and freedom from pinholes and bubbles. |
| c. Making a transparency with a spirit duplicator | The student will produce one good transparency as part of a regular duplicating run. |

5. Other uses for the overhead projector

| | |
|---|---|
| a. As a camera obscura | The student will produce a sketch of an object, building, large map or other material too large to place in the camera obscura. The student will make this sketch by using the overhead as a camera obscura, i.e., he/she will place the drawing paper on the stage of the projector and allow the lens system to produce an image on the paper which can be traced. |
| b. As a drawing aid for oversize graphics | The student will produce a large sign, map, banner, or supergraphic, using the overhead as a drawing projector, i.e., projecting an image onto an extra-large drawing surface, then tracing and filling in the image. |
| c. As a comparison projector for slides | |

**Equipment Needed – Transparency Production I**

3M "Secretary" or equal thermal copier
3M Model 107 Book Copier or equal, with paper dispenser
Diazo processing machine (Blue-Ray 912AV or equal)
or
Proto-Printer or "Pickle Jar" (Technifax-Scott or equal)

## Unit V – Sound Reinforcement and Public Address Techniques

(14 hours)

**Specific Objectives**

Students will demonstrate attainment of this unit by setting up, adjusting, and effectively applying public address systems in varied situations.

**Basic Content**

1. Basic sound amplification systems
2. Multiple speaker systems
3. Feedback suppression
4. Typical P.A. and sound reinforcement jobs

**Suggested Learning Activities**

| Classroom–Theory | Laboratory |
|---|---|
| 1. Basic sound amplification systems | |
| a. P.A. vs. sound reinforcement | The student will demonstrate an ability to set up portable public address systems in a variety of situations. He will demonstrate ability to interconnect and operate accessory equipment such as record players and tape recorders. |
| b. The portable P.A. system | |
| (1) The bullhorn<br>(2) Lectern P.A.'s<br>(3) Sound trucks | |
| c. Fixed installations | |
| (1) System design<br>(2) Speaker selection<br>(3) Control locations | The student will demonstrate an ability to operate fixed public address systems in a variety of situations, including panel discussions and theatrical presentations. |
| 2. Multiple speaker distribution systems | |
| a. Connections | The student will demonstrate an ability to connect 2, 4, 6, and 8 speakers in arrays. They must match the amplifier's impedance and be properly phased. |
| b. Impedance matching with multiple speakers. | |
| 3. Feedback suppression | |
| a. The nature and causes of regenerative feedback<br>b. Feedback as a function of speaker type and placement<br>c. The effect of room acoustics on feedback<br>d. The effect of microphone type and placement on feedback | The student will demonstrate an ability to obtain the highest output level possible from a public address installation with complete freedom of "ringing" or feedback. He will achieve this level through the proper selection and placement of microphones. |

4. Typical P.A. and sound reinforcement jobs

a. The speech
b. The panel discussion
c. The convocation or graduation
d. The play
e. The rock concert
f. The whispering singer
g. The football game

The student will, upon assignment from his instructor, handle one live public address or sound reinforcement job. He/she will be responsible for the selection, interconnection, and operation of equipment. Classmates may assist.

**Equipment Needed – P.A. Systems**

Battery-powered bullhorn
Lectern-type portable P.A. system
Fixed public address system
Exponential horn speakers, weatherproof (8 per class)
Heavy-duty portable speaker stands (6-8 per class)
Public address amplifier (100 watts or more) with multiple inputs, built-in mixer, and 25 and 70.7 volt outputs.

A wide selection of microphones of different types and constructions, including the following:

Dynamic Cardioid or Super-Cardioid (5-10 per class)
Dynamic Omnidirectional EV-635A (5 per class)
Hi-Quality Dynamic Cardiline Unidirectional for Boom Mounting (one per class)
Moderately good quality Electret Condensers, Sony ECM-22P or equal (4 per class)
Broadcast ribbon microphone (R.C.A. 77DX or equal) (2 per class)
"Tie-Tack" Condenser Mike (Sony or equal) (one per class)
Miniature lavaliere mike, EV649B or equal (4 per class)
Long-reach, inexpensive Cardiline Dynamics EV-644 "Sound Spot" or equal (2 per class)

NOTE: The microphones listed above are used not only in the P.A. section of the curriculum but in all sections of the curriculum including motion picture, T.V., and recording. They are grouped here for convenience in comparison and ordering. Similarly, stands and accessories are listed below.

Microphone Stands and Accessories:

Microphone floor stands (8 per class)
Baby booms (Atlas) (4 per class)
Medium-duty fixed booms (1 per class)
Large mobile rotatable boom, Century or equal (optional)
Flexo Mikemaster (permanently installed)
Table stands (8 per class)
E–U Mike Mouse (8 per class)
Miscellaneous stand extensions, goosenecks, adapters, etc.

Cone P.A. speakers in single baffles (8 per class)
Line transformers with multiple output taps (10 per class)
"T" and "H" pads (8 of each per class)

Miscellaneous high-quality P.A. and sound-reinforcement speakers of horn and line-radiator types.

## Unit VI – Television Production I

**(24 hours)**

Prerequisite: Television-equipment operation, maintenance, and interconnection, from M[illegible] Equipment Component

**[illegible]ecific Objectives**

The student will demonstrate beginner's skills in television production as follows:

1. State the essentials of pre-production planning.
2. Define the roles of specific studio staff members.
3. Perform each of the above roles in actual productions, including that of writer-producer of a 5-minute television production.

**Basic Content**

1. Pre-production planning
2. The studio staff and their functions
3. Limited television production

**Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Pre-production planning –<br>a. Pre-planning<br>b. Script readings<br>c. Dry runs<br>d. The technical rehearsal | The student will demonstrate a knowledge of the general considerations involved in pre-production planning. Each student will plan a television production as he cycles through the producer and director roles in the exercise below. |
| 2. The studio staff members and their functions<br>a. The Producer<br>b. Director<br>c. Camera operator<br>d. Floor manager<br>e. Production assistant<br>f. Video switcher<br>g. Audio switcher<br>h. Boom or fishpole operator<br>i. Lighting director<br>j. Videotape operator<br>k. Film-chain operator<br>l. Cable handlers, prop people, etc. | The class will tape short (5-minute) television productions equal in number to the number of students in the class. Each student will act as the writer-producer for one presentation and rotate through the other staff positions, as well as acting as "talent" in at least one show. These presentations will be done in the T.V. studio with ½-inch portable, black and white video equipment. As each presentation is "canned," it will be critiqued by the entire class. Those presentations having possible instructional value within the Multi-Media Technology Program will be retained as a trial run for later color production. |
| 3. Limited television production | |

**Equipment Needed – Television Production I**

Monochrome video-camera ensemble, with camera, electronic viewfinder, 200m lens, microphone, tripod, cables and storage case (Sony AVC-3200 10 X 0 or equal) (3 per class)

Folding, inexpensive dollies for above (3 per class) (Sony TD-1 or equal)
Monochrome special-effects generator w/4 camera inputs (Sony SE6-1 or equal)
Quad monochrome video monitor (Sony PVM-400 or equal)
Microphone mixer w/VU Meter (Sony MX-900 or equal)
Videotape recorder (½" EIAJ) with electronic capstan editing (Sony 3650 or equal)
Videotape recorder (½" EIAJ) without electronic editing (Sony 3600 or equal)
18" TV set or video monitor
R.F. adapters for Videotape recorders (one per VTR)
Studio intercom consisting of 8 headsets, interconnecting cables, and director's control
Tape storage cabinet (Luxor or equal)
Completely portable, battery-operated ½" monochrome EIAJ camera and VTR (Sony Video Rover II or equal) with accessories
Shoulder-mount camera brace (back-pack type) to fit above camera
Portable tripod

## Unit VII – Audio Recording, Editing, and Synchronizing I

(24 hours)

### Specific Objectives

Students will demonstrate abilities in the audio-recording field as follows:

1. Record live presentations of various types
2. Duplicate and dub sound from recorded sources.
3. Edit sound as required.
4. Synchronize sound narrations into slide and filmstrip presentations.

### Basic Content

1. Room acoustics for tape recording
2. Duplication and dubbing
3. Editing and splicing
4. Typical recording situations

### Suggested Learning Activities

| Classroom | Laboratory |
|---|---|
| 1. Room acoustics for tape recording | |
| a. Effect of room acoustics on recorded sound<br>b. Room acoustics for microphone placement<br>c. Aural perspective and how to change it<br>d. Recording in "live" rooms | The student will make three monophonic recordings of the same spoken sentence. All recordings will be made with the microphone at 3 feet. One recording will be made in a small, acoustically "hard" room (such as a tiled lavatory), one will be made in a normal room, and one will be made outside. The student will analyze the resultant recordings.<br>The student will repeat the procedure in the same three locations, but in this trial will utilize various techniques to try to make all three recordings sound as much alike as possible. |
| 2. Duplication and dubbing | |
| a. Recording from phonodisks<br>(1) Simple patching from phonographs<br>(2) Connections to high-fidelity components<br>(3) Needle scratch and its elimination. Problem of cracked and broken records. | The student will demonstrate an ability to make satisfactory tape copies of phonodiscs on reel-to-reel, cassette, and 8-track cartridges, using both moderate-quality and high-quality equipment. |

| | |
|---|---|
| b.Duplicating tapes–form conversions | The student will demonstrate ability to duplicate tapes and convert from one form to another, specifically:<br>a. Stereo cassette from stereo reel-to-reel master<br>b. An 8-track cartridge from both reel-to-reel and cassette masters. |
| c. High-speed duplication | The student will demonstrate an ability to make duplicate tape cassettes, using a high-speed duplicator. Copies will be suitably documented for classroom and/or library use. |
| d. Documentation of recorded tapes | Throughout the above exercises, the student will adequately document certain designated tapes for departmental and/or library use. |
| 3. Splicing and editing | |
| a. Splicing devices and splicing tape | The student will make 10 acceptable splices using each of three splicing methods. These splices will exhibit good mechanical strength, lack of air bubbles, and neither a gap in nor overlap of the oxide coating. |
| b. Editing to eliminate unwanted material. | The student will demonstrate an ability to edit by eliminating:<br>Clicks recorded by starting and stopping the recorder<br>Long pauses between musical selections.<br>Stutters, coughs, or repeated words and phrases.<br>Applause from a "live" performance.<br>The student will attach a 3-foot piece of colored leader tape to the "head" end of a practice tape. |
| 4. Typical recording situations | |
| a. Recording a single speaking voice<br>b. Recording a panel discussion or debate<br>c. Emphasizing a single voice in a group<br>d. Recording solo musical instruments | The student will be assigned a minimum of two recording projects by the instructor. One of these will be of a musical performance. The student will be responsible for all aspects of production, from equipment selection and logistics to editing, timing, and documentation of the finished tape. The student may recruit one or more classmates to help, as required by the nature and extent of the project. |

(1) Piano (spinet and grand)
(2) Violin
(3) Guitar
(4) Saxophone or clarinet
(5) Trumpet or other brass winds
(6) Drums

**Equipment Needed – Audio Recording and Editing I**

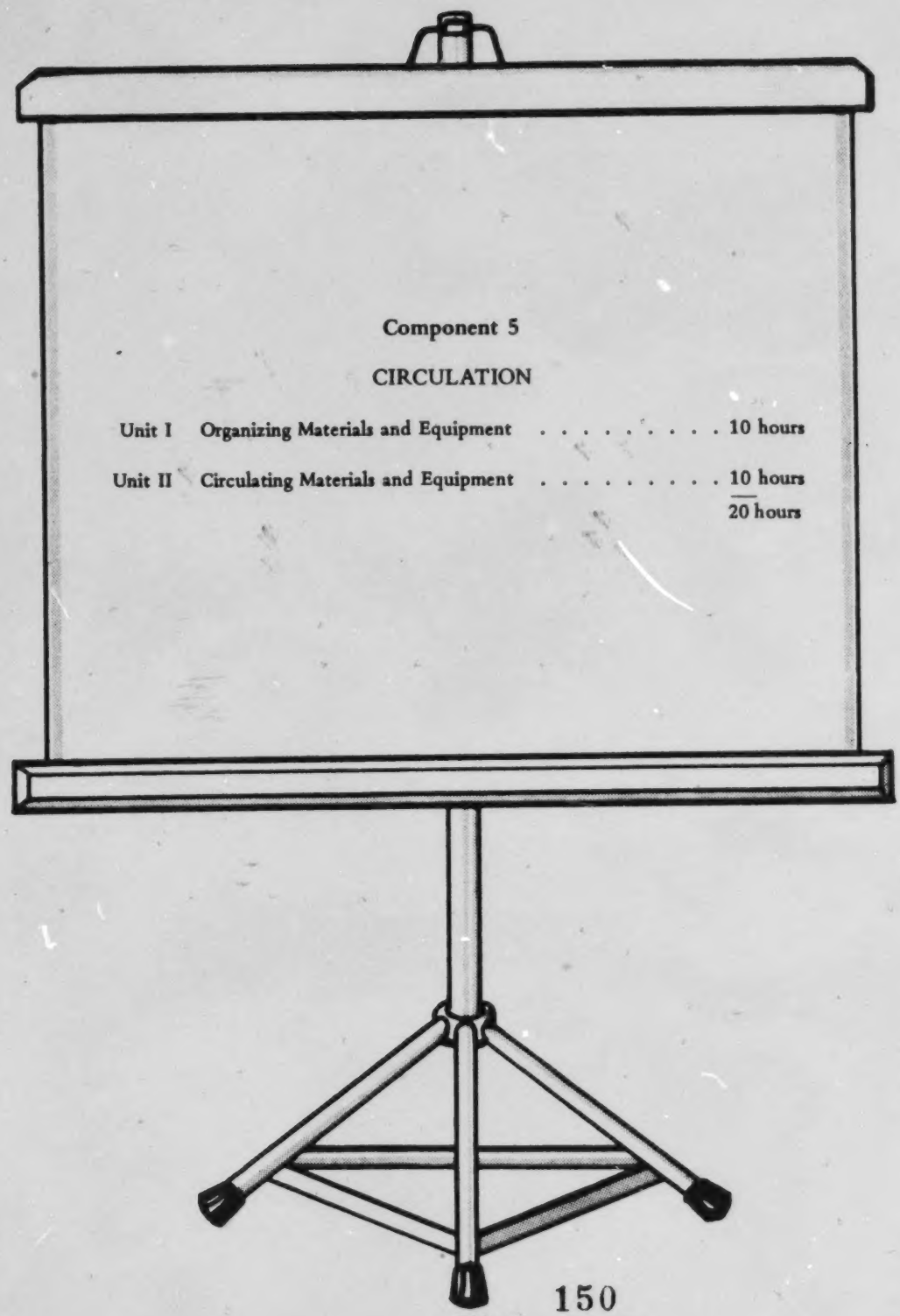
Bulk Tape Eraser
Classroom phonograph with output jack

Monaural or stereo tape recorder with easily accessible heads and defeatable tape lifters for editing work (one per 3 students)

High-quality transcription turntable fitted with top-grade magnetic cartridge (one per class – two will be required for second year's work.)

Stereo preamplifier (Middle-line hi-fi quality)
Stereo power amplifier and moderate-quality speakers
High-quality cassette tape deck with dolby noise-reduction system
Monophonically wired cartridge with a selection of custom styluses to match old records

8-Track Car-Tape recording deck
High-speed mono cassette duplicator, Wollensak or Telex
Gibson-Girl-type tape splicing device
Editall aluminum splicing block (one per 3 students)
Miscellaneous patch cords, junction boxes, adapters, attenuators, and equalizers for entire unit



## Component 5

## CIRCULATION

| | | |
|---|---|---|
| Unit I | Organizing Materials and Equipment . . . . . | 10 hours |
| Unit II | Circulating Materials and Equipment . . . . . | 10 hours |
| | | 20 hours |

## Component 5 – Circulation

### Unit I – Organizing Audiovisual Materials and Equipment

(10 hours)

**Specific Objectives**

The student will demonstrate abilities to perform routine tasks needed for classifying, cataloging, and processing new media materials and equipment, as follows:

1. List the steps needed to process incoming materials and equipment.
2. Prepare a shelf-list or inventory-record card.
3. Process materials and equipment for use.
4. File shelf-list or inventory-record cards properly.

**Basic Content**

1. Unpacking and checking order received against packing slip.
2. Assigning positive identification to each item (code or accession number).
3. Classifying and cataloging new materials and equipment (limited to preparation of shelf-list or inventory-record card.)
4. Completing the processing of materials and equipment.

**Suggested Learning Activities**

Note: All instruction and activities will take place in the Instructional Materials Center (IMC).

| Instruction | Activities |
|---|---|
| 1. Introduce step-by-step tasks involved in unpacking and checking orders upon receipt. | The student will assist in unpacking and checking new materials and equipment received in the Instructional Materials Center (IMC). |
| 2. Explain the steps necessary in arranging new items before processing can begin. | The student will arrange new materials and equipment according to local scheme used in IMC prior to processing. |
| 3. Introduce methods of positive identification of materials and equipment, such as an accession number or code. | The student will assign positive identification to materials and equipment, such as rubber stamp for property identification, metal plate for equipment, and IMC accession number or code. |

| | |
|---|---|
| 4. Discuss the need for cataloging and classifying new materials and equipment. | The student will assist media technician by assigning storage symbols for keeping materials and equipment together. |
| Introduce storage symbols for keeping (shelving) materials and equipment together according to category. | The student will complete processing of new materials and equipment by affixing shelving labels. |
| 5. Explain the purpose and preparation of a permanent record of materials and equipment in an IMC, such as the shelf-list or inventory-record card. | The student will make entries for the shelf-list or inventory-record card on new materials and equipment. |
| List the information needed for the shelf-list or inventory-record card entries. | |
| 6. Explain the need for charge cards to keep track of all the equipment. List the information needed on the charge cards and explain how they are filed. | Student makes up charge cards for new equipment and fastens card pocket to equipment. |
| 7. Review the steps necessary to completely process new materials and equipment, including all of the above. | |
| 8. Describe the system of filing shelf-list (inventory-record) cards in the same arrangement as that used to store (shelve) materials and equipment. | The student will file shelf-list (inventory-record) cards in the same order as the materials and equipment are arranged in storage. |
| | The student will place newly processed materials and equipment in storage or refer them to person who has requested them. |

## Unit II – Circulation of Materials and Equipment

**(10 hours)**

**Specific Objectives**

The student will maintain all records necessary for proper circulation of all types of materials and equipment.

**Basic Content**

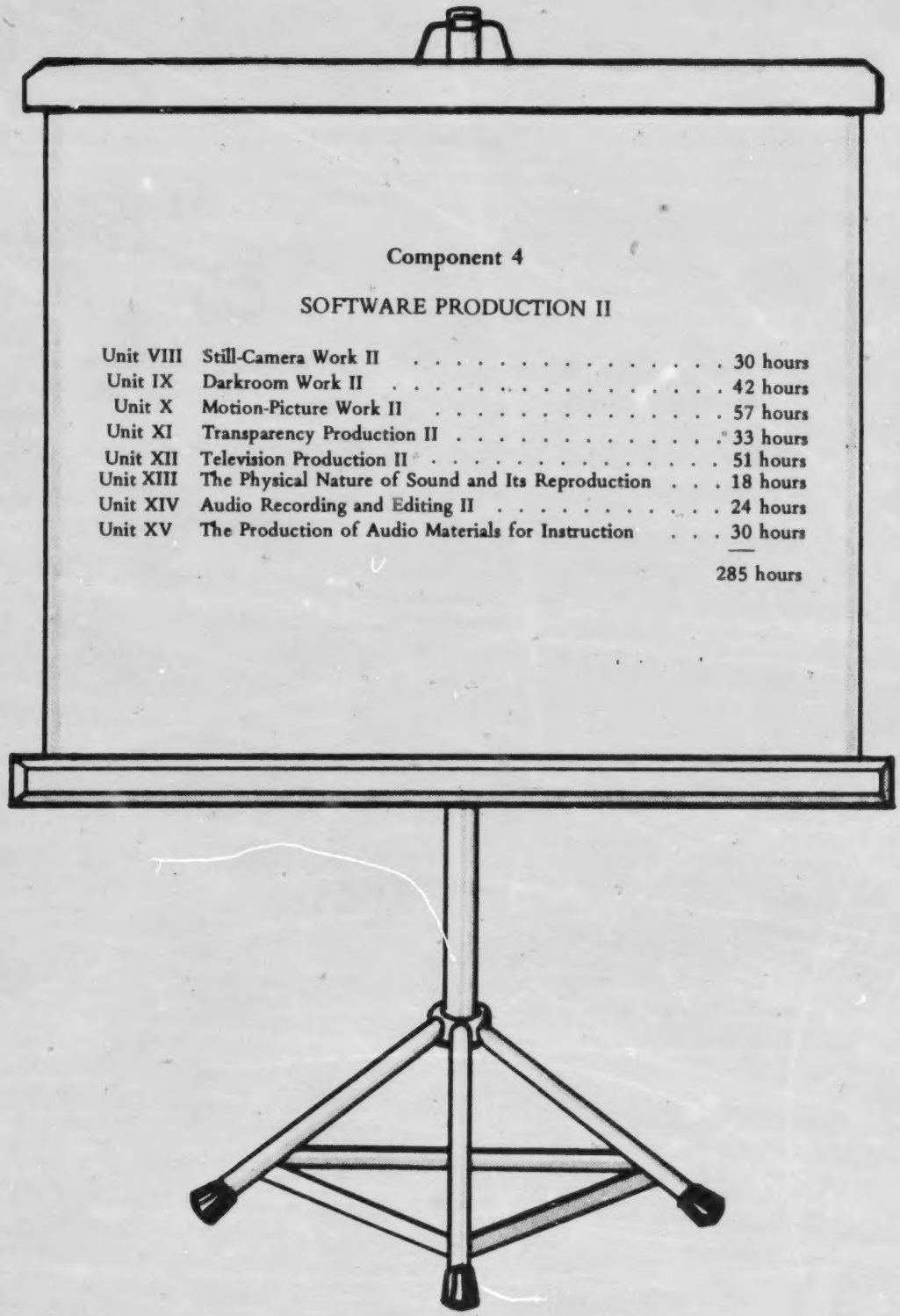
1. Reserving and scheduling materials and equipment.
2. Charging materials and equipment to borrowers.
3. Crediting materials upon return.
4. Following up on materials and equipment overdue.
5. Checking returned materials and equipment for damages.
6. Labeling and referring damaged materials and equipment for repair prior to storage.

**Suggested Learning Activities**

| Instruction | Activities |
|---|---|
| 1. Present philosophy of serving the public quickly and efficiently. | The student will perform the following activities: |
| 2. Explain need to keep proper circulation records in order to carry out that philosphy. | |
| 3. Introduce several different circulation systems: photographic, self-charging, machine-charging, and computer-charging. | |
| 4. Detail the circulation system procedures employed in this IMC, using circulation manual. | Keep accurate records of media hardware and software in circulation. |
| 5. Discuss the duties of media technician in signing out materials and equipment. | Assist in signing out materials and equipment to borrowers. |
| 6. Discuss the procedure for crediting materials and equipment upon return. | Credit materials and equipment returned to IMC. |
| 7. Explain methods of scheduling use of equipment and materials, including the *reserving* of equipment. | Schedule use of equipment.<br><br>Process requests for materials and equipment in use by maintaining the *reserve* system. |

| | |
|---|---|
| 8. Discuss tickler system and follow-up procedures on overdue materials and equipment. | Keep a tickler system and follow up on overdue materials and equipment. |
| 9. Discuss methods of handling returns with materials missing and/or damaged. | Check returned materials for damages. Label the problem and refer to proper party for repair, replacement, etc. |

Second Year



Component 4

SOFTWARE PRODUCTION II

| | | |
|---|---|---|
| Unit VIII | Still-Camera Work II | 30 hours |
| Unit IX | Darkroom Work II | 42 hours |
| Unit X | Motion-Picture Work II | 57 hours |
| Unit XI | Transparency Production II | 33 hours |
| Unit XII | Television Production II | 51 hours |
| Unit XIII | The Physical Nature of Sound and Its Reproduction | 18 hours |
| Unit XIV | Audio Recording and Editing II | 24 hours |
| Unit XV | The Production of Audio Materials for Instruction | 30 hours |
| | | 285 hours |

## Component 4 – Software Production II

### Unit VIII – Still-Camera Work II

(30 hours)

**Specific Objectives**

The student will demonstrate fairly advanced techniques in photography, as follows:

1. Take monochrome and full-chrome photographs of good technical and artistic quality.
2. Perform the above under varied lighting and environmental conditions.
3. Select suitable cameras and films for a particular situation.
4. Duplicate color pictures and slides, correcting color balance if necessary.
5. Convert slides into filmstrips.

**Basic Content**

1. The physical nature of light
2. Basic geometrical optics
3. Basic composition
4. Camera types
5. Films revisited
6. Photographic filters
7. Copy-stand work
8. Intermediate duplication
9. Portraits
10. Conversion of slides into filmstrips
11. Portfolio

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. The physical nature of light<br>a. Properties of light<br>b. Light and color<br>c. Reflection<br>d. Refraction<br>e. Diffraction<br>f. Polarization | |
| 2. Basic geometrical optics<br>a. Simple lenses, types and functions<br>b. Lens theory and basic lens math | Using a simple meter-stick optical bench, a lamp, and lenses of three different focal lengths, the student will discover the basic relationships between lens focal length, object size, image size, lens-to-image distance, and lens-to-object distance.<br>The student will review the basic camera parts and their functions. |

| | |
|---|---|
| c. Illumination | The student will take illumination readings using a foot-candle meter, and incident-light readings using an exposure meter, under different illumination levels. The student will enter the findings on a work-sheet and discover the relationship between the two types of light measurements. The student will then compute exposure from foot-candle measurements. |
| 3. Basic Composition | |
| a. Subject placement<br>b. Balance<br>c. Background and foreground<br>d. Perspective<br>e. Camera angles | The student will take a series of pictures to illustrate the principles of good composition. Included will be landscapes, people groups, still lifes, etc. These pictures will be attached to worksheets and an analysis of each picture written out by the student. |
| 4. Camera types | |
| a. Box cameras<br>b. Folding cameras<br>c. View camera (studio)<br>d. Press camera<br>e. Twin-lens reflex camera<br>f. Single-lens reflex camera<br>g. Sub-miniature camera<br>h. Polaroid camera (195)<br>i. Fingerprint camera ] Special<br>j. Oscillograph camera ] Purpose<br>k. Stereo cameras; panoramic cameras<br>l. Motion-picture camera | The student will briefly examine each camera, completing a comparison chart while examining them. He/she will then answer questions from the completed chart. The student will be tested on the advantages and disadvantages of each camera type, and on the specific modifications of the specialized cameras that make them suited to the purpose for which they were designed. |
| 5. Films revisited | |
| a. Matching color films to illumination | The student will analyze his/her previously taken color slides on the basis of color only. He/she will then note on the worksheets what type of color film would provide the most natural colors in each situation. |
| b. Reciprocity | The student will take three color slides under very dim lighting conditions that will demonstrate reciprocity failure and its correction. |

c. High-contrast materials and other specialized films

Using a press or view camera equipped with a polaroid back, the student will take several pictures of the same subject, using both high-contrast and regular film. He/she will mount these pictures on a worksheet and draw conclusions about the two films regarding:

1. Contrast
2. Exposure latitude
3. Grain structure

6. Photographic filters

a. Color temperature and its measurement

Using a color-temperature meter, the student will attempt to measure the color temperature of the following sources, and record the measurements on a worksheet:

1. Sunlight
2. Regular 100-watt incandescent lamp
3. No. 2 photo floodlamp
4. No. 2B photo floodlamp
5. Portable movie light (halogen)
6. Slide-projector lamp (ECH)
7. Interior of a heat-treating furnace
8. A welding arc
9. Blue dichroic floodlamp
10. Candle flame
11. Fluorescent lamp

b. Decamired filters and their application

Using the above information, the student will compute the proper decamired filtration to balance the above light sources to match both daylight and type-A color film. The student will then select 5 sources, and with the computed filtration, try to use these light sources to take color slides. The resulting slides will be analyzed by both the student and the class.

c. Neutral density filters

(1) Applications

(2) Computing exposure change

Using a 35mm camera, high-speed Ektachrome film and neutral density filters, the student will take two slides of a scene in bright sunlight. The principle point of interest in the scene should be 10 feet or closer to the camera. The first slide should be taken without filtration, at the smallest aperture of the camera. The second slide should be taken with filtration computed by the student, using the largest aperture of the camera. The resulting slides should demonstrate the student's competence in the selection of neutral density filters, exposure calculations associated with the use of these filters, and the application of these filters to allow selective focus techniques to be employed with high-speed emulsions.

| | |
|---|---|
| 7. The professional copy stand | Using the permanently set up heavy-duty copy stand, the student will take 6 well-exposed pictures at magnification ratios of 4 : 1 to 1 : 1. Three of these should be of small objects or small portions of large objects. These will be taken using electronic-flash illumination and daylight color film. |
| a. Electronic flash as a lightsource for copying | |
| b. Macro lenses | |
| c. Depth-of-field considerations | |
| d. Eliminating reflections | Using the above equipment plus polarizing filters, the student will take 4 pictures of shiny, non-metallic objects having curved surfaces. The resulting slides should show the object in good focus, with no visible reflections. The student will repeat the experiment with metallic objects, attempting to minimize reflections. |
| 8. Intermediate duplication | |
| a. Basic setup and operation of duplication devices | Using a self-instructional program, the student will become familiar with the operation of the Bowens Illumitran. He/she will then make two acceptable duplicates of a slide (not-color-corrected). The student will use the Bowens Illumitran to make a duplicate of one underexposed and one overexposed slide from his collection of previous "mistakes." The student will attempt to bring the slides to an acceptable density by using the duplicator. |
| b. Exposure correction through duplication | |
| c. Color correction in duplication | Using a slide from a previous exercise that shows gross color imbalances, the student will select suitable color-correction filters and make a corrected duplicate having acceptable color balance. |
| d. Chromatic manipulation for artistic purposes | Using a well-exposed slide, the student will purposely create color imbalances to change the "mood" or otherwise enhance its artistic value. The use of multiple exposures is allowed in this exercise. |
| 9. Portraits: | The student will produce two high-quality portraits, one formal, black-and-white studio shot with full lighting control, and one informal color shot in a natural setting. Two different subjects should be used, both known to the student. The results will be judged not only on composition and technical quality but also on the ability of the student to portray the subject's character. |
| a. Portrait composition<br>b. Lighting for portraits<br>c. Lessons from Karsh<br>d. Makeup, costuming, and retouching<br>e. Diffusion | |

| | |
|---|---|
| 10. Conversion of slides into filmstrips | Using a set of slides, the student will prepare a filmstrip, using a half-frame camera on the Illumitran. The filmstrip will incorporate title, focus, and "start sound" frames in accordance with commonly accepted standards. This filmstrip will be synchronized later with a cassette (Unit XV) |
| 11. Portfolio | The student will start a portfolio of his/her best work in photography and other media, for use in obtaining employment. In some cases where the original is needed for instructional purposes, for example, transparencies, duplicates or photographs of the items may be made. |

**Equipment Needed – Still Camera Work II**

Note: Only equipment not previously listed in Software Production I will be listed in Software Production II, and only where it is first used.

Filters

Color-temperature meter (Gossen Sixticolor, Spectra, or equal) (1 per 5 students)

Set of 14 decamired filters in 52mm screw-in mounts with adapters and reducers to fit all SLR cameras used (1 set per 5 students)

Set of 36 color-compensating filters in 52mm screw-in mounts, with adapters and reducers to fit other cameras. Set to consist of six filters each in yellow, magenta, cyan, red, green, and blue, with densities of .05 to .50 (2 sets per class)

Neutral-density filters, set of 3 (ND-1, ND-2, ND-3) in 52mm threaded mounts with adapters and reducers to fit available cameras (2 sets per class)

Heavy-duty copy stand with lighting assembly (B & J Saturn or equal)

Polaroid MP-4 camera system – Complete

Bowens Illumitran-3 with miscellaneous camera and lens adapters

Olympus Pen-F Half-Frame 35mm Camera (NOTE: At time of publication, distribution of this camera had been discontinued in the U.S.A. but was available on the second-hand market.)

Heavy-duty studio camera stand, Arkay 8MS-8 or equal

Complete set of color-correction filters in 3"x3" gelatin squares (36 filters with spares of more popular types) (one set per class)

Keystone or equal Stereopticon or Sawyer Viewmaster

## Unit IX – Darkroom Work II

(42 hours)

**Specific Objectives**

The student will demonstrate fairly advanced darkroom techniques, as follows:

1. Develop and print both monochrome and negative color photographs of good technical quality.
2. Process reversal color films
3. Produce filmstrips and mounted slides of good q uality.

**Basic Content**

1. Intermediate enlarging and cropping
2. Printing modifications
3. Photography for hard-copy reproduction
4. Stabilization processing
5. The reversal process continued
6. Slide mounting

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Intermediate enlarging and cropping | |
| a. Aspect ratios of common negatives and prints | The student will measure a variety of negatives and prints and compute the aspect ratios to determine those commonly used in photography. |
| b. Use of cropping "L's" | Using an enlargement of a full film frame, the student will make and use one or more sets of cardboard cropping "L's" to select portions of the negative for later enlargement. These portions will be marked on a tissue overlay. The student will repeat this, using a contact print of one of his own negatives. |
| c. Operation of enlarger | |
| 2. Printing modifications | |
| a. Multicontrast print materials | Using a 35mm negative that the student has taken and processed, the student will make a series of 7 4"x5" prints identical except for their contrast. He/she will use Kodak poly-contrast rapid paper and filters to produce these prints and mount the completed series as a poster on index stock. |
| b. Changing contrast by manipulating developing times. | |

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| c. Dodging and burning-in | Using a portrait negative taken in section 9 of Unit VIII, the student will make an 8"x10" enlargement using dodging and burning-in techniques to enhance the artistic quality of the result. The student will select a paper suitable to the subject. |
| d. Toning | The student will produce a series of 8"x10" prints of a variety of subjects, using different paper textures, with a variety of tones. The results will be judged on both the technical quality of the prints and how well the paper and toning used contributes to the artistic rendering of the subject matter. |
| 3. Photography for hard-copy reproduction | |
| a. Image-quality requirements for photo-mechanical reproduction<br><br>b. The basic theory of halftone reproduction | The student will select a previously produced print having the optimum contrast and other quality considerations for halftone reproduction. The content of the photo should be such as to allow its incorporation into a single-page printed sheet. Suitable examples would be:<br>a. A machine or other apparatus to which labels will be added indicating its operating controls.<br>b. A photo for a handbill for a student running for a school office.<br>c. An advertisement for an internally produced product (plastics ware, food, etc.) |
| c. Elementary layout | The student will make a pencil layout representing the finished printed piece. This layout will include reduction or enlargement of the photo, sizes of headlines and captions, with all copy specified. |
| d. Use of the MP-4 camera system for the production of screened positives. | The student will make a halftone positive of the selected photograph, using the Polaroid MP-4 camera. This positive will be accurately sized for the printed sheet and exhibit good dot formation. |
| e. Simple pasteup for offset printing | The student will produce a finished mechanical incorporating the screened positive, headlines, captions, and body copy. |
| f. Electrostatic plate production | The student will make a good-quality electrostatic plate. |

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| g. Reproduction using the offset press. | The student will run off a quantity of this item, using the offset press. |
| 4. Stabilization processing | |
| a. Advantages and disadvantages of stabilization processing<br>b. Applications of the stabilization process<br>c. Operation of the Ektamatic processor<br>d. The process and processors<br>e. Papers available for stabilization printing<br>f. Costs of stabilization printing<br>g. Stabilization chemistry<br>h. Processing tips. Making stabilized prints permanent | The student will expose and process one or more 8"x10" prints using the Ektamatic processor.<br><br>The student will produce two identical 4"x5" contact prints by stabilization methods. No printing controls will be used other than exposure. The student will then fix one print for permanence. He/she will place both prints on a bulletin board and observe their degradation over a 1-month period.<br><br>After successful completion of this exercise, the student will be allowed to elect this method of processing for certain jobs that require maximum production speed. |
| 5. The reversal process, continued | |
| a. Duplicating slides | The student will bulk-load a cassette with Ektachrome duplicating film 5038. He/she will then use this film to make copies of several previously taken slides, using a camera-mounted copying device and tungsten illumination. Process the film in E-4 chemistry, with processing modifications if necessary. Compare the copies with the original slides. |
| b. Large transparencies | Using a press or view camera, the student will expose two 4"x5" Ektachrome transparencies and will process these transparencies. |
| 6. Slide mounting | The student will precision-mount one pair of slides for special dissolve- and multiple-projection applications, using a method of his/her own choice. |

**Equipment Needed – Darkroom Work II**

Headlining equipment
Electrostatic platemaker
Stabilization processor (one per class):
- Ektamatic 214-K
- Ilford Ilfoprint Super 24 Mark II
- AGFA-Geuhert Rapidoprint LD-54
- Supreme Supre-Print SP 2000
- or equal

## Unit X – Motion Picture Work II

(57 hours)

### Specific Objectives

The student will demonstrate advanced skills in motion-picture work, as follows:

1. Take, edit, and prepare for presentation both 8mm and 16mm motion pictures for a variety of purposes.
2. Demonstrate competence in the above, using various cameras, projectors, and accessories, under various conditions.
3. Film slow-motion, time-lapse, and closeup motion pictures.
4. Produce a short animated film.
5. Effectively script for both silent and sound single-concept film loops, and produce both.

### Basic Content

1. Why "movies"?
2. Projector work
3. Lighting techniques
4. Planning and scripting techniques
5. Slow-motion and high-speed cinematography
6. Time-lapse photography
7. Close-up cinematography
8. Animation principles and techniques
9. Types and methods of animation
10. Sound script work

### Suggested Learning Activities

| | Classroom | Laboratory |
|---|---|---|
| 1. | Why "movies"?<br><br>a. Motion and motion pictures – their use in an instructional setting.<br><br>b. Motion pictures vs. video tape | The student, given a list of short descriptions of "instructional problems," will select those that would best benefit from treatment by motion pictures and those best handled through other media techniques. |
| 2. | Projector work | The student will demonstrate an ability to properly operate a carbon-arc motion-picture projector. |

The student will demonstrate an ability to make smooth projector changeovers in multiple-reel presentations.

The student will demonstrate an ability to properly operate the Kodak MSF-8 projector both alone and in conjunction with a synchronized audio tape.

The student will manually code a 50-ft. film for automatic-stop operation in the Kodak Ektagraphic MFS-8 projector. He/she will code no less than 8 automatic stops in applicable sections of the film.

3. Lighting techniques

a. Problems in the use of built-in exposure systems

(1) Backlighted outdoor scenes
(2) Backlighted outdoor portraits
(3) Snow and beach scenes
(4) Backlighted water scenes
(5) Zoom shots
(6) Pan shots
(7) Following a moving subject
(8) Sunsets and sunrises
(9) Indoor scenes with windows
(10) Titles

The student will make 15- to 30-second motion-picture scenes of good technical quality in four of the 10 problem situations, using a camera of the student's own choice. The resulting film will show good technical quality.

b. Available-light motion-picture photography

(1) Night movies
(2) Filming stage presentations
(3) Filming sporting events and ice shows
(4) The color of available light
  (a) Candle light
  (b) Incandescent light
  (c) Fluorescent light
  (d) Daylight through windows
  (e) Light in sports arenas, stage shows, and gymnasiums
  (f) Neon signs

The student will photograph 3 subjects under differing available-light conditions. The finished footage will demonstrate ability to select the proper film and filtration, as well as mastery of exposure-control in these situations.

c. Filters for motion picture photography

(1) Neutral density filters
(2) Conversion filters
(3) Combination filters
(4) Light-balancing filters
(5) Color-compensating filters
(6) Filters for fluorescent light
(7) Sky-light or haze filters
(8) Polarizing filters
(9) Filter for black and white
(10) Special-effects filters
(11) Using filters—which, when, and where
(12) The filter factor

The student will shoot acceptable motion-picture footage that will demonstrate competence in the use of 5 of the 10 filter types listed. Scene length will be dictated by subject matter.

The student will (by test) demonstrate his ability to select the proper filtration for a special light/film combination. He/she will also demonstrate the ability to make filter-factor corrections.

4. Planning and scripting techniques

a. The storyboard and use of planning cards
b. Continuity
c. Variety
(1) Scene length
(2) Camera-to-subject distance
(3) Cutaways
(4) Sequences

The student will be assigned the project of planning and scripting a single-concept film. The topic will be assigned by the teacher.

The student will then make the film. This film will be 2 to 3 minutes in length and without sound. The student will use titling techniques previously learned.

5. Slow-motion and high-speed cinematography

a. Variety with camera speeds
b. Slow motion and fast motion
(1) Analysis
(2) Comic effects

c. The Fastax and other special high-speed motion-picture cameras.

The student will attend a track-and field meet or practice, and film three slow-motion sequences of a suitable event.

6. Time-lapse photography

a. Single-frame filming
b. Applications for time-lapse filming
(1) Animation
(2) Accelerating movement
(3) Filming short scenes
(4) Stop motion
(5) Time-lapse sequences
(6) Surveillance

The student will produce a time-lapse motion picture of a suitable subject (Ex: Sunset, blooming flower, burning candle), of a length not to exceed 3 minutes.

c. Frame rate in single-frame filming
   (1) Short scenes
   (2) Speeding of moving objects
   (3) Stop-motion
   (4) Time lapse
   (5) Moving stationary subjects
   (6) Animation

d. Special considerations in surveillance work
   (1) Films
   (2) Lighting
   (3) Focus
   (4) Triggering devices

7. Close-up cinematography

a. Lenses for close-up work
b. Magnification and working distance
c. Depth of field
d. Focusing
e. Extension tubes
f. Close-up lenses
g. Exposure increase with extension tubes
h. Cinephotomicrography
i. Filming through a telescope
j. Copying slides and movie frames
k. Slide-dissolves

The student will make a minimum of three 1-minute film sequences under the following conditions:

1. Ultra-closeup range. The subject field shall be from 3"x4" to 6"x8".

2. Macro range. The subject field shall be from 3/5"x4/5" to 3"x4".

3. Micro range. The subject field shall be less than 3/5"x4/5" and be photographed through a microscope.

Subjects will be of the student's choice but must involve movement.

8. Producing animated films

a. Steps in preparation of a commercial presentation (Hanna-Barbera example)

b. Planning the animated film
   (1) The storyboard
   (2) The exposure sheet
   (3) Planning action
   (4) Artistic expression
   (5) Planning animation and sound
   (6) Movement cycles

c. Equipment for animation
   (1) Camera requirements
   (2) The animation stand
   (3) Lighting equipment
   (4) Tripods and dollies

The student will produce a 3-minute film showing at least 6 animation techniques. Each sequence is to be titled.

9. Techniques of animation

a. Animation by the cameraman
b. Cel animation
c. Animating three-dimensional objects
d. Puppet animation
e. Paper cutouts
f. Graphs, charts, maps, lines, and arrows
g. Special effects in animation
h. Animating mouth movements
i. Using closeups
j. Cutaway and reaction shots
k. Combining animation with live action
l. Shortcuts in animation
   (1) Limited animation
   (2) Ikonography of filmograph techniques
   (3) Scratchoff
   (4) Cel pans
   (5) Progressive disclosure
   (6) Cutouts
   (7) "Goldbergs"
   (8) "On twos"
m. Evaluating animation

Animation by hand-drawn cels is *not required.* Should a student wish to make a sequence by this technique, it should not exceed 5 seconds on the screen. (Remember that one minute of animation can require up to 1440 individual drawings.)

10. Script preparation (sound considerations)

a. Keeping it visual
b. Writing narration
c. Other script considerations
d. Music and sound effects

The student will plan and photograph magnetic-sound single-concept film. This film should demonstrate his/her cumulative knowledge of motion-picture techniques. The topic will be assigned by the instructor.

**Equipment Needed – Motion Picture Work II**

Internally made storyboard of plywood and molding with purchased plastic strips (one per 3 students)

Motion-picture cameras having slow- and fast-motion capability

(Optional for advanced work): High-speed motion-picture camera (Fastax , Hylam, or equal), rented when needed

A selection of 16mm motion-picture cameras having reflex viewing systems and sophisticated features including provision for mounting filters in front of or behind the lens. (One per 10 students) Suggested choices:

Bolex H-16 SBM
Canon Scoopic 16m
Beaulieu R16B
Arriflex 16m or 16BL

A complete set of color-balancing or color-correction filters in 3" x3" gelatin squares and in glass-threaded mounts.

Rugged, general-purpose 16mm camera having single-frame capability (one per five students): Bell and Howell Model 70HR with 3 lenses, 400' magazine, case, etc.

Intervalometer or time-lapse timer for above camera. Suggested choices:

Pulsar (American General Products)
Priccand-Wild Vaniotimen

Surveillance camera, Kodak Analyst Super 8 with mounting bracket, sighting mirror, remote-control switch, sound absorbent box, and voltage converter for a.c. operation

Sets of close-up lenses, extension tubes, and macro lenses for available 16mm cameras

Microscope adapters for available 16mm cameras

Animation stand

Collection of background and sound-effects records:

"Sound for a Picture Evening" – 4-record set by Popular Photography
Various selections from Major Records and DeWolfe catalog
"Musi-Cue II," background music tape

## Unit XI – Transparency Production II

(33 hours)

**Specific Objectives**

The students will demonstrate abilities in producing transparencies, as follows:

1. Produce various types of overhead projectuals, using a variety of different methods.
2. Design projectuals that are effective teaching instruments.

**Basic Content**

1. Hand-drawn transparencies
2. Electrostatic (Xerographic) transparencies
3. Photographic transparencies
4. Masks and overlays
5. Polarized transparencies
6. Transparent and moving models

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Hand-drawn transparencies | |
| a. Methods and materials for making hand-drawn transparencies<br><br>b. Mounting and protecting transparencies | The student will prepare 10 hand-drawn transparencies utilizing the techniques learned in the Drafting and Art Components. Each of these transparencies will show good layout and design as well as instructional value. In the entire group, competence in each of the following techniques will be exhibited.<br><br>1. Hand lettering with permanent felt pens<br>2. LeRoy or Varigraph lettering with acetate inks<br>3. Wrico lettering with acetate inks<br>4. Opaque and transparent transfer lettering<br>5. Use of self-adhesive transparent tapes, e.g., Chart-Pak<br>6. Use of self-adhesive colored plastic sheets to add color to large areas<br>7. Use of felt pens for adding color to small areas<br>8. Framing and labeling of transparencies. |

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| | In this section the student will start with direct art on acetate, but may proceed to the hand-drawing of masters at the instructor's option. |
| c. Enlarging and reducing aids | The student will produce an enlarged or reduced *transparency master* on tracing tissue using the camera obscura. He/she will retain this master for production of transparencies in later sections.<br><br>(Optional) The camera obscura may also be used for production of photographic transparencies as part of section 3 below. |
| 2. Electrostatic (xerographic) transparencies | |
| a. The principal of electrostatic copying<br><br>b. Advantages and disadvantages of the electrostatic process | The student will produce a minimum of 5 transparencies as assigned by his instructor. These may be made from pre-printed, modified, or completely student-produced originals as required. Two of these transparencies will be reduced from oversize artwork. |
| 3. Photographic transparencies | |
| a. Advantages and disadvantages<br>b. Special processing considerations | The student will prepare three continuous-tone photographic transparencies using techniques learned in Units VIII and IX. The student will make any and all modifications to the photographic image required, including the addition of labels and other information produced by non-photographic methods. The student will produce three high-contrast enlarged photographic line transparencies from reduced originals. |
| c. The use of photographic transparencies as masters for diazo production<br><br>d. The full-color photographic transparency | The student will use one of the previously produced photographic transparencies as a duplicating master to generate diazo copies. |
| 4. Masks and overlays | |
| a. Sequential overlays | The student will design, generate the artwork for, and produce a transparency having up to three overlays that will demonstrate the sequential development of a concept, a process, or mechanical operation. The topic will be assigned by the instructor. |

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| b. Non-sequential overlays | The student will similarly produce a transparency having up to four overlays that will illustrate a non-sequential changing condition or comparison. The topic will be assigned by the instructor. |
| c. Moving masks | The student will design and produce a transparency incorporating hinged or sliding mask for the selective imparting of information on a topic assigned by the instructor. |
| d. Black-background transparencies | The student will produce a black-background transparency utilizing sliding masks for the sequential imparting of information. |
| 5. Polarized (animated) transparencies | |
| a. Polarization theory<br>b. Birefringent materials | Using two 2-inch square pieces of polarizing material and common birefringent materials such as cellophane and cellophane tape, the student will prepare a simple abstract design whose colors are created solely through polarization. |
| c. The use of polarized light to simulate motion | The student will produce a transparency utilizing a minimum of two types and three speeds of polarized motion. The topic of this transparency will be assigned or approved by the instructor. |
| d. Techniques for making "Technamated" transparencies | |
| e. Criteria for selecting topics to be animated. | |
| 6. Transparent and moving models | |
| a. Commercially available projectable models and devices and their applications.<br>b. Construction requirements for projectables<br>c. Fabrication techniques for acrylics<br>(1) Cutting<br>(2) Joining and sealing<br>(3) Air injection to show motion in fluids<br>(4) Pivots, axles, and slides for moving parts | The student will construct a projectable model for use with an overhead projector. This model will be of the student's devising to fit a particular demonstration need. Construction will be suited to the nature of the device, ranging from simple moving dials on simulated gages and meters that might be fabricated from thick, flexible acetate, to gears and other mechanisms cut from 1/8" or thicker acrylic and mounted on a ¼" acrylic base plate. |

d. Special considerations when using an overhead projector in a non-vertical position.

**Equipment Needed – Transparency Production II**

Camera obscura
Xerox or equivalent photocopier with reduction capability
Motorized polarizing spinner for overhead projector
Small jig saw (12" to 14" throat)
Small belt sander (1" wide belt)
Motor-driven polishing head or "home-type" grinder equipped with buffing and polishing wheels

Small hand grinder, Dremel variable-speed or equal, with drill press, bench stand, and routing attachment

Small oven (lab type)
Small hand tools (tongs, saws, taps, and dies, clamps, miter box, etc.)

## Unit XII – Television Production II

**(51 hours)**

**Specific Objectives**

The student will demonstrate advanced skills in television production by performing all the tasks required to produce an effective TV show, from scripting to final editing.

**Basic Content**

1. Script-writing
2. Staging for TV
3. Lighting
4. Camera work
5. Graphics
6. Film systems for TV
7. Post-production evaluation
8. Videotape editing and splicing
9. Television audio systems
10. Handling and storage of magnetic tapes
11. "On location" documentary videotaping

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Television script writing<br>a. Terminology<br>b. Directions<br>c. Timing, continuity, etc.<br>d. Dialog | The student will write a script and prepare a completely marked-up copy for a television production. After approval by the instructor, the student will provide copies of this script for the producer, director, technical director, floor manager, and instructor. |
| 2. Staging for TV<br>a. Staging cameras<br>b. Staging talent<br>c. Friendly/antagonistic staging<br>d. Cross-shooting | |
| 3. Television lighting<br>a. Past practices<br>b. Control systems<br>c. Fixture types<br>d. Illumination and its measurement<br>e. Suspension system<br>f. Modern lighting practices | |

4. Television camera work

| | |
|---|---|
| a. Operation of the color television camera<br>b. Tripods, pedestals, dollies, and booms<br>c. Camera-handling and zoom-lens techniques<br>(1) Fields of view<br>(2) Focusing<br>(3) Lining-up the lens<br>(4) Close shots | The student will demonstrate mastery of all camera techniques as a camera operator in a student production. |

5. Television graphics

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|---|---|
| a. Importance of graphics in TV<br>b. Use of the sign machine<br>c. Television format requirements<br>d. Color and black and white slides for TV<br>e. The IBM Selectric Composer<br>f. Preparation of "crawls"<br>g. Preparation of rolls for Teleprompter-type devices | The student will prepare graphic materials for TV presentation, utilizing at least three different techniques. |

6. Film systems for TV

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|---|---|
| a. The use of motion-picture film in TV production<br>b. The basic film chain (Teledine)<br>c. The optical multiplier<br>d. Technical requirements for video film | The student will demonstrate competence in the adjustment and operation of a television film chain.<br><br>The student will shoot an 8mm or 16mm film sequence specifically for film-chain use. He/she will edit this film for use in an internally produced TV presentation, and operate the film chain during the actual video taping. |

7. Post-production evaluation

| | |
|---|---|
| a. The need for post-production evaluation<br>b. Criteria for evaluation<br>c. Correction of faults | The student will actively participate in the post-production evaluation of video-taped programs produced by his classmates. He/she will identify both artistic and technical faults and suggest means by which they could have been avoided or corrected. |

8. Videotape editing and splicing

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|---|---|
| a. Problems of mechanical editing<br><br>b. Electronic editing | The students, working in teams of 3, will produce an instructional videotape, utilizing a single camera and single videotape recorder having electronic editing capability. They will utilize the electronic editing feature to insure picture stability between scenes. Scenes must be shot sequentially, and the program must include a minimum of 10 electronic edits. |

The student, working with one other student assisting, will assemble a videotape presentation from a number of non-sequential "takes" made on different videotape recorders. The resulting tape will show the student's ability to make smooth electronic edits and also mastery of the switcher-fader in making satisfactory lap dissolves, wipes, inserts, and split-screen effects.

c. Videotape splicing

(1) Splicing requirements
(2) Splicing pitfalls
(3) Contamination
(4) Videotape duplication

The student will make 10 videotape splices that show good mechanical strength and smoothness, and that are undetectable when the spliced tape is recorded and played.

9. Television audio systems

a. Microphones and microphone mountings for TV

b. The mixing console

c. Sound perspective

d. Studio acoustics

The student will demonstrate mastery of television audio techniques by participating in the role of audio mixer for a student-produced television production. The audio track of the finished tape should show smooth transitions between music and narration, consistent audio levels, and an appreciation of audio perspective. Overdubbing and sound effects may be used if required.

10. Handling and storage of magnetic tapes

a. Importance of cleanliness of recording area
b. Tape storage
c. Shipping tapes
d. Operating and handling habits
e. Fire, water, and radiation

The student will demonstrate good tape handling and storage practices while participating in various audio and TV activities.

The student will demonstrate his ability to properly document those tapes he produces.

11. "On location" documentary videotaping

a. Field use of portable video reloading equipment
b. Planning a documentary
c. Shooting techniques
d. Post-production assembly of program

The student, with one assistant, will videotape a documentary of some event. He/she will then assemble the raw footage, along with any studio shooting and audio overdubbing necessary, into a finished presentation that will be critiqued by the class.

**Equipment Needed – Television Production II**

Color T.V. studio meeting the general specifications outlined below (Individual specifications to depend upon available funds and instructor's preferences)

Studio room about 20 x 30 ft., air-conditioned, with minimum floor-to-roof-joist height of 14 ft.

Control room, 16 x 16 ft. minimum, with slanted-glass, double-glazed window to the studio.

Audio announce booth (optional), with window to control room and studio.

Complement of color-TV equipment including but not limited to:

3 Cameras w/tally lights, zoom lenses, pedestals or tripods, intercom provisions, and camera controls

Video-control console with monitors, switcher-fader, waveform monitors, character generators, etc.

Audio-control console with minimum of 4 inputs

Talkback system to studio and announce booth

Two color VTR's with electronic editing and flying erase heads (reel-to-reel or cassette)

Film chain with optical multiplexer and facilities for 8mm motion pictures with magnetic sound, 16mm motion pictures with magnetic and optical sound, and 2"x2" slides

Large color receiver-monitor with top-grade antenna, antenna tower, and rotator

Audio tape recorder and two turntables

Audio monitoring system (stereo)

Selection of microphones

Kodak Super 8mm Video Player (optional)

Studio lights (3200°K), grid-mounted, of sufficient quantity, intensity, and type to provide a minimum of 100 foot-candle illumination in the action area with a variety of controls. All fixtures to have provision for mounting gels.

Lighting-control system, consisting of a control console and wiring to power and control all studio lights.

A variety of microphone mountings, including at least one long-reach, rotatable T.V. boom and a number of small fixed booms.

A selection of sets and props.

Splicing blocks for ½" ¾" and 1" videotape (one each per 5 to 10 students)

## Unit XIII – The Physical Nature of Sound and Its Reproduction

(Optional – 18 hours)

**Specific Objectives**

The student will demonstrate an ability to solve problems relating to sound, its amplification, recording, and reproduction, as follows:

1. Display adequate knowledge of the physical properties of sound and how these properties affect its amplification and reproduction.

2. Solve audio problems that arise, through analysis rather than by application of memorized "stock solutions."

**Basic Content**

1. The production of sound
2. The transmission of sound
3. The reception of sound
4. Frequency
5. Intensity
6. Wavelength, resonance
7. Interactions of sound waves
8. Sound-reproduction systems
9. Quality in sound reproduction and its measurement

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. The production of sound | |
| a. Simple harmonic motion–the pendulum<br>b. Vibrating objects<br>c. Vibrating columns of air | |
| 2. The transmission of sound | |
| a. Air and its makeup<br>b. Transmission through air, liquids, and solids<br>c. The Doppler shift<br>d. Reflection and absorption | |
| 3. The reception of sound | |
| a. The ear | The student will demonstrate knowledge of physiological workings of the ear by written examination. |
| b. The microphone | |
| 4. Frequency | Working in pairs, the students will test each other's hearing and prepare an audiogram. |
| a. Frequency and ear training<br>b. Frequency and pitch<br>c. Frequency measurement | |

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|---|---|
| 5. Sound Intensity | |
| a. Volume – loudness<br>b. The measurement of sound intensity – the decibel scale | Using the sound-level meter, the student will measure the intensity of several sound sources around the school. He will also use this meter to balance speakers in a public-address system. He will check the balance at three different frequencies. |
| 6. Wavelength and resonance | |
| a. The relationship between speed, frequency, and wavelength of sound waves<br>b. Resonance<br>c. Measuring wavelength of a tuning fork | Using a resonance column and a tuning fork of unknown frequency, the student will experimentally determine the wavelength of the sound produced by the tuning fork and from this wavelength, calculate its frequency. He/she will check the results by measuring the frequency of the unknown fork with a frequency meter. |
| 7. Interactions of sound waves – Interference effects from multiple sound sources | The class will set up two loudspeakers outside, facing a parking lot or other cleared area. Using a continuous tone, the class will determine points of constructive and destructive interference and mark these with chalk on the pavement. This determination will be repeated at two additional frequencies. |
| 8. Sound-reproduction systems | |
| a. The high-fidelity music system<br>b. Audio components, their selection based on needs | |
| 9. Quality in sound-reproduction systems | |
| a. Frequency response and its measurement | Using a test record and a high-quality audio VTVM, the student will measure the electrical frequency response of an inexpensive phonograph. He will graph his results on semi-log graph paper.<br><br>Using a test audio tape and VTVM, the student will make a playback frequency-response determination of a reel-to-reel or cassette tape recorder.<br><br>Using an audio oscillator, a high-quality blank tape, and an audio VTVM, the student will make record-playback frequency-response measurements of a tape recorder. |
| b. Signal-to-noise ratio | The student will make signal-to-noise determinations at 1000 or 333 Hz. |

| | |
|---|---|
| c. Distortion | (Optional)<br>Using the Ferrograph analyzer, the student will make harmonic and intermodulatory distortion measurements of a tape recorder. |
| d. Audio power | (Optional)<br>Using distortion meters, the student will make harmonic and intermodulatory distortion measurements on a high-powered audio amplifier. |
| e. Wow and flutter<br><br>f. Transient response in audio transducers | (Optional)<br>Using a wow and flutter meter and suitable test record or tape, the student will make wow and flutter determinations of turntable, record player, or tape recorder. |
| g. Multi-path distortion in F.M. reception | (Optional)<br>Using a high-quality FM tuner, an oscilloscope, and a rotatable antenna, the student will learn to identify multi-path distortion and orient a receiving antenna to minimize its effects. |
| h. Checking speeds of tape recorders and record players | Utilizing a calibrated test tape and a frequency meter, the student will measure the speed of a tape recorder and calculate its percentage error.<br><br>Utilizing a strobe disk, the student will determine whether a record player is running fast or slow and then check and quantify his findings with a frequency meter. |

**Equipment Needed – Sound and Its Reproduction**

Audiometer, wide-range, calibrated
Tuning fork set, equally tempered scale, diatonic (referenced to A=440), Welch No. 3244 or equal

Organ pipe with sliding piston, Welch 3272 or equal (one per class)
General radio sound-level meter
Audio oscillator, range 20 Hz. to 20 KHz. minimum, distortion less than 0.1% throughout range, with built-in output meter and 111 db. attenuator, Hewlett-Packard Model 206A or equal

Resonance-tube apparatus, large type with stand and calibrations, Welch 3309 or equal
Tuning fork, 512 Hz., heavyweight, Welch 32416 or equal (one per class)
Test records: CBS, Command, Vanguard, etc. (assortment)

V.T.V.M., audio type, range 0.003 volts to 300 volts, frequency response flat ± 0.1 db from 10 Hz. to 100 KHz., with both voltage and decibel scales.

Test tapes, reel-to-reel and cassette: Ampex, Sony, and Norelco
Ferrograph Tape Recorder Performance Analyzer (optional)
Harmonic distortion meter, sensitivity 0.1% at 300 microvolts (optional)
Intermodulatory distortion meter (optional)
Oscilloscope
Crown Audio Analyzer (optional)
Wow and flutter meter (optional)
F.M. tuner with oscilloscope outputs (optional)
F.M. Antenna, high gain (optional)
Strobe disk and fluorescent lamp
Test tapes and cassettes with calibrated 60 or 1000 Hz tones
Digital frequency meter

## Unit XIV – Audio Recording and Editing II

(24 hours)

**Specific Objectives**

Students will demonstrate advanced skills in audio-tape recording by recording, mixing, editing, and performing all other tasks associated with the production of audiotape recordings.

**Basic Content**

1. Tapes, tracks, and speeds
2. Editing to change timing
3. Editing to change content
4. Multichannel mixing and recording

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Tapes, tracks, and speeds | (Optional)<br>The student will run frequency-response and signal-to-noise measurements on several different types of tape. The results will be compared and analyzed by the class. |
| a. Types of recording tapes and their characteristics | |
| b. Commonly used tape widths and packagings | |
| c. Track standards | (Optional)<br>The student will record a 200 Hz tone at 0VU on a reel-to-reel, 4-track stereo tape recorder, utilizing tracks 1 and 3. He/she will then develop the magnetic pattern on a short section of the tape, using a colloidal suspension of iron in alcohol. He/she will then strip the magnetic pattern from the tape, transfer it to a 2"x2" slide-cover glass, and measure the track placement and widths, using a measuring microscope. These measurements will then be compared with accepted standards. |
| d. Tape speed and fidelity | |
| 2. Editing to change timing | The student will demonstrate an ability to shorten or lengthen a musical selection through careful editing. The edited tape should be of such quality that the sections added or deleted would be undetected by a careful listener. |

| | |
|---|---|
| 3. Editing to change content | The student will record a paragraph of speech and, through careful editing, completely change the content of the original message. |
| 4. Multichannel mixing and recording | |
| a. Multichannel mastering for monophonic production<br>b. Mixing techniques, cueing<br>c. Compression and expansion<br>d. Remixing and reverberation<br>e. Overdubbing, sound-on-sound, and sound-with-sound | The student will become thoroughly familiar with the multichannel mixing console. He/she will then demonstrate competence in the operational techniques of the equipment by acting as audio engineer for one or more productions, as assigned by the instructor. These assignments will require the following competencies:<br>a. The ability to master a four-channel, multiple-input program and mix this down to a monophonic or stereophonic duping master.<br>b. The ability to master a multi-track tape composed of overdubbed music (e.g., the "one man band").<br>c. The ability to rechannel a monophonic musical selection into stereophonic or quadraphonic form, adding reverberation and other modifications necessary to produce an enhanced aural perspective or effect.<br>d. The ability to manually "ride gain" as well as to employ compressors and limiters to equalize widely varying audio levels. |

**Equipment Needed – Audio Recording and Editing II**

Collodial suspension of iron in alcohol, "Magna-See" or equal (4 oz. per student)
Measuring Microscope
High-quality stereo tape deck
Preamplifier with octave-equalization filters, Soundscraftsmen or equal
Multichannel mixing console with 4-channel output, pan pots, studio talkback facilities, and reverberation unit
4-channel tape deck with simul-sync (two per class)

## Unit XV – The Production of Audio Materials for Instruction

(30 hours)

**Specific Objectives**

Students will produce instructional materials of an audio format to be used either alone or with a visual component.

**Basic Content**

1. Audio tutorial instruction
2. Audio synchronization systems for slides and filmstrips
3. Sound-on-slide, sound-page, and similar systems
4. Mastering techniques for the generation of synchronized programs

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Audio tutorial instruction | |
| a. Advantages of self-paced, audio instruction<br>b. Automatic program-stop on cassette machines<br>c. Responder-controlled instruction | The student, working with an instructor, will prepare (1) an audio tutorial program incorporating printed material and (2) an audio cassette programed for self-paced instruction. |
| 2. Audio synchronization systems for slides and filmstrips | |
| a. Filmstrip-record synchronization system (DuKane 30/50) | The student will use the filmstrip produced in Unit VIII or will obtain from the instructor either a captioned filmstrip or a filmstrip with a non-synchronized record. He/she will then prepare a synchronized cassette to go with the filmstrip, utilizing the DuKane Subsonic 50 Hz synchronization system. The student will then verify the performance by running the newly generated tape with the filmstrip on a synchronized projector or viewer. |
| b. Filmstrip-cassette synchronization system (DuKane 50) | |
| c. Slide-cassette synchronization systems (2nd track 1000 Hz and 150 Hz.) | The student will prepare a synchronized slide-tape presentation utilizing slides that he has previously prepared and a narration that he/she will write. The student will use cassette synchronizing equipment of the 2nd track, 1000-Hz tone type. |

d. Audio tone synchronization system for use with reel-to-reel recorders

e. Digital synchronization systems.

The student will demonstrate an ability to encode reel-to-reel tapes with both audio-tone and digital synchronization systems. He/she will demonstrate by using empty slide trays unless he/she has developed skill to the point of being able to synchronize an actual single- or multiple-projector presentation.

f. Conversion of 30/50 Hz. Dukane system records to 50 Hz. DuKane cassette system

The student will prepare a synchronized DuKane system cassette from a DuKane 30/50 Hz system synchronized record provided by his instructor. He will verify its performance by running the cassette with its associated filmstrip on suitable playback equipment.

3. Sound-on-slide, sound-page, and similar systems

a. Machine operation

b. Applications of these systems

The student will prepare finished presentations utilizing both sound-on-sound and sound-page systems, as assigned by the instructor. Teacher-planned lessons will be used.

4. Mastering techniques for the generation of synchronized programs

a. The need for reel-to-reel mastering
b. Use of multiple-track masters for multiple-use programs

The student will prepare a 4-channel master tape configured as follows:
Track 1 – Narration, audible and background signals, music
Track 2 – Narration only
Track 3 – Sync signals only
Track 4 – Redundant sync signals or background music

c. Systems and techniques for automatic generation of synchronized cassettes from multitrack reel-to-reel masters

The student will prepare synchronized cassettes from this master tape of the following types:

1. Narration with 50 Hz inaudible signals on the same track (DuKane system for filmstrips)
2. Narration on upper track with 1000 Hz sync signals on lower track (Std. slide system)
3. Narration, audible and 50 Hz inaudible signals on upper track with 1000 Hz signals on lower track ("Universally Synchronized Cassette")

| | |
|---|---|
| | The student will verify the synchronized cassette with counters and/or the actual slide set or filmstrip for which the tape was prepared. The student will demonstrate ability to add or delete synchronized signals to or from the master tape and regenerate track 1 when changes are necessary. |
| d. Duplication and regeneration of synchronizing signals | The student will make two copies of "Universally synchronized" cassette, utilizing a high-speed duplicator, and verify the performance of each copy.<br><br>The student will demonstrate competence in duplicating a 2nd track 1000 Hz synchronized cassette while at the same time regenerating the sync track. (Technique for salvaging "glitched" cassettes.) |

**Equipment Needed – Audio Materials for Instruction**

Cassette recorder with program-stop capability, Wollensak or Optosonics (one per 3 students)

Responder to interface with above (one per recorder)

DuKane Cassette Synchronizer

Cassette synchronizer using 1000 Hz. second-track sync pulses (one per five students) (Wollensak 2550 or equal)

Kodak Slide-Tape Synchronizer (2 per class)

Wollensak/Arion Digital Programer

DuKane Micromatic Projector

DuKane Conversion Accessory

3M Sound-on-Slide Recording Projector, Model 625AGR

3M Sound Page, Model 627AAA recorder/player

3-Channel custom-designed and -constructed relay interface module

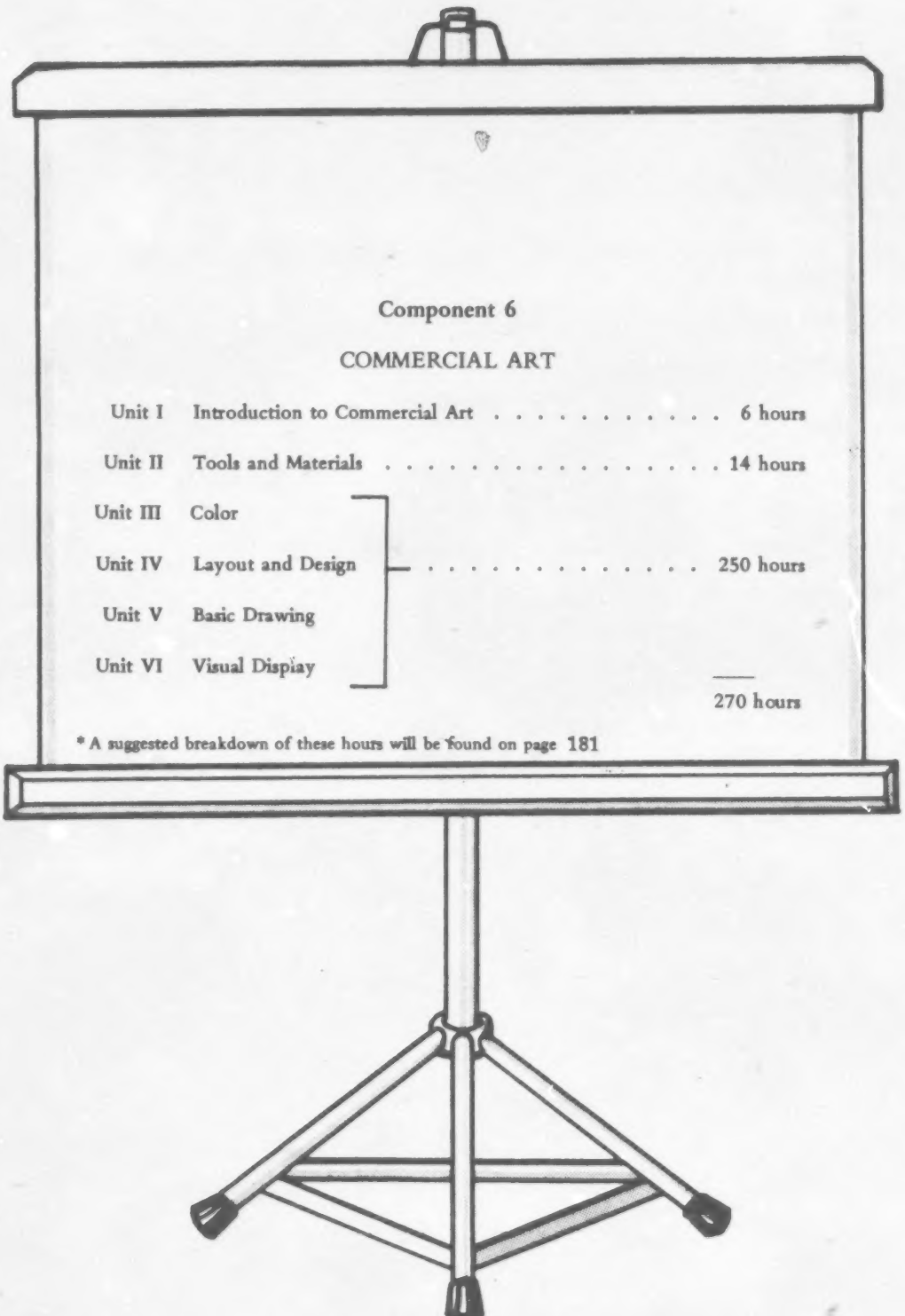
3-Channel electro-mechanical counter module

Wollensak Cassette Tape Recorder with slide change and program-stop capabilities (one per 3 students)

3-Channel pulse-tone programer (Electronic Designers or Arion)

High-speed cassette tape duplicator (Wollensak or equal)

Second Year



Component 6

COMMERCIAL ART

| | | |
|---|---|---|
| Unit I | Introduction to Commercial Art | 6 hours |
| Unit II | Tools and Materials | 14 hours |
| Unit III | Color | |
| Unit IV | Layout and Design | 250 hours |
| Unit V | Basic Drawing | |
| Unit VI | Visual Display | |
| | | 270 hours |

* A suggested breakdown of these hours will be found on page 181

## Component 6 – Commercial Art

### Introduction

This component has been divided into six units: Introduction, Tools and Materials, Color, Layout and Design, Basic Drawing, and Visual Display. It is strongly recommended that, after the two introductory units, each of the other four units be introduced briefly and then coordinated as per the suggested schedule on the next page. Such an integrated approach should enable students to gain the maximum benefit from each, applying new knowledge and skills from each area in working out projects.

Each of these four units contains both simple and complex activities the teacher may implement. The simple activities require only limited experience in the other areas and can be pursued immediately. Complex activities require greater insight and experience within the other areas.

The above approach stresses the interrelationships of the various art elements. A notation at the end of these activities refers the instructor to activities in other areas that would aid student performance.

For example, the instructor might begin teaching color, but then switch to layout design so the student can develop insights in two-dimensional design. The student can then incorporate these insights into the work with color problems, and vice versa. By so doing, the student would fully experience the relationship of color and design.

Basic drawing should be taught throughout the component, since the desired skills can be attained only through continuous experience and practice.

Student and teacher review and critique of all work should occur throughout the component. Each student should maintain a portfolio of his/her best efforts for future use in seeking employment.

## SUGGESTED SCHEDULE FOR COORDINATING UNITS III THROUGH VI

| | Unit III – Color | Unit IV – Layout & Design | Unit V – Basic Drawing | Unit VI – Visual Display |
|---|---|---|---|---|
| 16 hours | 1. Definition of terms<br>2. Color wheel | 1. Layout materials & function<br>2. Two-dimensional design<br>a. Symmetry & Asymmetry<br>b. Balance | 1. Elements of drawing<br>a. Line | |
| 18 hours | | c. Contrast<br>d. Emphasis<br>e. Movement | b. Shape<br>c. Texture<br>d. Pattern<br>e. Rhythm | 1. Constructing a cube |
| 20 hours | 3. The gray scale | f. Depth | f. Space or depth | |
| 20 hours | 4. Modifying color<br>5. Colored light vs. colored pigment<br>6. Color harmony | g. Proportion<br>h. Unity | | 2. Mounting & matting |
| 18 hours | | 3. Layout procedure<br>a. Preparation<br>b. Assembly of elements<br>c. Sketching the layout<br>d. The comprehensive | 2. Drawing procedure | 3. Designing wall displays |
| 20 hours | | e. Image generation<br>f. Scaling methods | 3. Styles and media<br>a. Airbrush | |
| 40 hours | 7. Color illusions | 4. Lettering and type<br>5. The mechanical | b. Technical illustrations<br>c. Pictorial illustrations<br>d. Graphic designs | 4. Designing three-dimensional displays |
| 10 hours | 8. Color psychology<br>a. Symbolism | | e. Cartooning | |
| 10 hours | b. Preference | | 4. Lettering | |
| 26 hours | 9. Color selection | | | 5. Signs, posters, window cards |
| 52 hours | | | 5. Specific learning problems | 6. Stenciling (optional)<br>7. Screen printing (optional)<br>8. Visual display project |

## Component 6 – Commercial Art

### Unit I -- Introduction to Commercial Art

**Specific Objectives**

The student will demonstrate beginning discrimination in the field of commercial art by performing the following to instructional standards:

1. Identify various categories of commercial art and their applications within media technology.
2. Outline steps essential to the creation and production of artwork.
3. Evaluate samples of artwork as to their effectiveness for their purposes.
4. List and define criteria for the evaluation of their own work.

**Basic Content**

Note: This unit requires only a classroom, while subsequent units will also require access to drafting tables, light tables, and flat art tables (for silk-screen and sign work).

1. Commercial art in multi-media
2. Kinds of work done in the commercial art field
3. Basic procedure for the development of a visual message
4. General criteria for evaluating work
5. Course description

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Commercial art in multi-media | The teacher will demonstrate each point with effective examples illustrating each function. |
| a. Function of commercial art<br>(1) to communicate visually<br>(2) to attract attention<br>(3) to enhance the effectiveness of a message<br>(4) to motivate reaction | |
| b. Relationship to the other media | The class will discuss how art is utilized in all the other media studied in this course. |
| 2. Kinds of work done in the commercial art field | |
| a. Illustrations<br>(1) Technical illustrations<br>(2) Graphs and charts<br>(3) Pictorial illustrations<br>(4) Cartooning | The teacher will make up a display of various kinds of commercial art for the first class under this program. |

b. Graphic designs – geometric, abstract, symbolical, etc.
c. Paste-up and compositional arrangements
d. Lettering
e. Visual displays
f. Package designs (Not covered in this course)

At the end of this course, the class will create a slide presentation from the best materials produced by the students during the year. This will be used to introduce the field of commercial art to the next incoming class. (See page 249)

3. Basic procedure for the development of a visual message

a. Defining and analyzing the message
   (1) Content
   (2) Function
   (3) Nature of audience

The teacher will present examples of artwork that have essentially the same purpose but are designed for different audiences.

The class will discuss how the nature of the audience can affect the artwork; for example, an ad for a school picnic, etc., designed for different age levels.

b. Designing the visual image
   (1) Obtaining the visual idea
      (a) Consulting the person whom the job is for
      (b) Consulting idea sources such as clip art, clip files.
      (c) Brainstorming

Students will suggest and discuss idea sources.

Given several hypothetical projects which require commercial art skills, the students will arrive at various ideas for the visual image by brainstorming and consulting a clip file. They will select and discuss the images which best fit the requirements of the situation. Examples:

1. A driver-education teacher would like a series of illustrations showing how to change a flat tire, for use in his high school classes.
2. An executive needs an overhead transparency to illustrate in a general way how costs of production are rising while the market price of the product must remain stable due to competition.
3. The guidance department would like visual displays about government careers to be set up in each of the elementary and secondary schools.
4. The plumbing instructor wants an overhead projectual to illustrate the formula for the fitting allowance.

(2) Selecting materials, techniques, and size based on ——
(a) Cost
(b) Quality
(c) Quantity
(d) Time limitations

General class discussion on these considerations. Although the students have little knowledge of costs at this point, the teacher should emphasize the need to consider costs as well as the other considerations.

c. Production
(1) Creation of the image
(2) Layout of assembled and/or created materials
(3) Reproduction

4. General criteria for evaluating artwork
Does it attract attention?
Is it easy to read?
Is it easy to comprehend?
Does it give an immediate indication of what it is about?
Does it convey the correct message?
Is it geared to the nature of the audience?
Is it practical for its intended use?
Can it be produced or reproduced within cost and time limitations?
Are there any ways it could be improved to realize its purpose?

Based on present knowledge, the class will evaluate some examples of good and poor work with reference to each of the questions listed.

5. Course description

The teacher will outline the course and encourage the students to work at home on their own, even when not required for assignments. They should make a sketch of something each day in order to pinpoint weaknesses and improve their techniques.

Students should be encouraged to collect examples of effective artwork and also examples of figures and other drawings that will help them improve their own artwork.

**Equipment and Supplies Needed**

1. Equipment, supplies, and examples of commercial art as described above under Activities, including
   a. original artwork
   b. clip file or "morgue"
   c. slide or film strips
   d. projectors and screen
2. Storage cabinets
3. Books on commercial art in the classroom or library. Students should be encouraged to read through as many as possible.

## Unit II – Tools and Materials

(14 hours)

**Specific Objectives**

The student will demonstrate effective attainment of the unit by performing the following to instructional standards:

1. Select the most appropriate materials and tools needed for specific tasks.
2. Utilize materials and tools efficiently and to maximum advantage.
3. Select and draw with an appropriate medium for the problem at hand.

**Basic Content**

1. Papers
2. Pencils
3. Pens
4. Other drawing media
5. Brushes
6. Paints and inks
7. Drawing and measuring tools
8. Erasers and correction materials
9. Adhesives
10. Cutting tools
11. Image sources
12. Transfer type and graphic aids
13. Photo typositor
14. Light table
15. Projectors and viewers

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Papers | |
| a. Kinds | |
| (1) Drawing papers<br>(2) Tracing papers<br>(3) Bristol board<br>(4) Ross or stipple board<br>(5) Mat board/mount board<br>(6) Cross-section and quadrille papers<br>(7) Watercolor papers<br>(8) Colored tissue paper<br>(9) Construction paper | Students will examine samples of the various papers and note the types of artwork done on these papers. They should discuss the uses of each.<br><br>Students should note quality differences within the same type of paper.<br><br>By consulting catalogs, the students should note price differences within types as well as between types. |

(10) Color-aid paper
(11) Stencil and frisket paper
(12) Rice paper
(13) Acetates
(14) Specialty papers for visual displays
(15) Cardboard or chipboard

b. Physical characteristics of different papers and their use.
(1) Degree of translucency or opaqueness
(2) Absorbency
(3) Weight
(4) Surface finish

c. Storage

The teacher will point out the ideal way to store paper – flat, in the dark, and easily available. Acetates should be protected from dust and heat.

2. Pencils

a. Kinds
(1) Wooden
(2) Mechanical

b. Lead types
(1) Densities
(2) Widths
(3) Colored leads

c. Sharpening
(1) Pencil sharpeners
(2) Knife-sharpening
(3) Lead pointers
(4) Sandpaper pads

d. Holding the pencil
(1) Conventional writing position
(2) Sketching position for work on a vertical or slanted surface

Using a medium drawing paper, the student will draw a freehand line with at least six different densities of pencil, and mark each line with the proper grade code.

While trying out both methods of holding a pencil, the student will produce as many different marks as possible on a large paper, using different kinds of pencils and different point widths. He/she will experiment with curved lines, angular lines, slow strokes, fast strokes, stipling, and tonal gradations. These may be drawn randomly or arranged, possibly in rows or within squares. The students will describe the visual and tactile differences of the various pencils.

As pencils require sharpening, the students will try out the different types of sharpeners.

3. Pens

a. Nibs-type pen
(1) Holders
(2) Different nibs and the lines they create
(3) Care of pens

Using the nibs-type pen, the student will experiment with various pen points by covering a whole page with lettering in any style. The class will discuss the type of work that each point is best suited for.

| | |
|---|---|
| b. Flexible-point fountain pen<br>(1) Function<br>(2) Care of pen | The student will fill a pen with ink and make sure it is functioning properly. He/she will be responsible for the proper cleaning and storing of any pens used. |
| c. Technical pens<br>(1) Various kinds<br>(2) Parts and their functions<br>(3) Care of pens | By consulting catalogs, the student will note price differences between different types and brands. He/she should try out whatever types are available in class (as well as any he/she owns) and decide how well price correlates with quality. |
| d. Steel brushes<br>(1) Function<br>(2) Care | The student will create a sign using the steel brushes. For example, the students could make signs which indicate equipment storage areas around the room. |
| e. Ball-point pens | |
| 4. Other drawing media | |
| a. Markers<br>(1) Water-soluble<br>(2) Permanent-ink<br>(a) for use on paper<br>(b) for use on transparent film | Given various drawing media and papers, the student will experiment with them. He/she should be able to fill in an area with uniform color. The experimenting should include lettering and drawing free-hand swirls and curves. |
| b. Crayons | |
| c. Cray-pas | |
| d. Oil pastels | |
| e. Chalks and pastels | |
| f. Pencils and media sticks for transparencies | |
| 5. Brushes | |
| a. Kinds<br>(1) Composition of bristle<br>(2) Shape of bristle<br>(3) Function as related to composition and shape | Given different sized brushes, a type of fluid paint, and paper, the student will paint a sign that requires a variety of letter sizes. The student will practice making broad, single-stroke letters in printed and written form before working on the sign. Examples of signs done for bakery, produce, and meat counters should be shown. |
| b. Care and storage | |
| 6. Paints and inks | |
| a. Kinds<br>(1) Watercolor<br>(2) Designer's colors<br>(3) Tempera<br>(4) Casein<br>(5) Polymer or acrylic | Using several different brushes, the student will create the same sign at least three times, using a different kind of paint for each. |

(6) Gesso
(7) Oil-based paint for signs
(8) Drawing inks
(9) Acetate inks

b. Physical properties
(1) Composition
(2) Consistency
(3) Ability to mix with each other
(4) Drying time
(5) Surface finish
(a) gloss
(b) mat
(6) Solvent used

c. Application of paint
(1) Broad strokes
(2) Thin strokes
(3) Evenly filled areas
(4) Dry-brush techniques
(5) Wet on wet
(6) Washes
(7) Scumbling

d. Care and storage of paints and inks

The teacher will indicate when and why it is necessary to have a prepared ground on which to paint. He/she will demonstrate how to prepare a ground by using gesso. The students will prepare a large piece of chipboard (about 20"x20") for use during the Color unit.

After experimenting on scrap paper, the student will create a large composition showing each of the seven techniques listed and some samples of a visual interpretation of various adjectives, such as swirling, fluffy, rippled, smoky, prickly, fuzzy, etc., as follows:

1. Lightly draw a one-inch border around a *large* piece of paper. Within this border, draw at least 15 large squares or rectangles, evenly spaced and with margins between them.
2. In the first 7 squares, demonstrate each of the 7 techniques, using one brush and paints.
3. In the other squares, guided by the same 7 techniques, paint an interpretation of the various adjectives supplied by the instructor. Any medium or combination of media may be used. Label each.

Given various art-related problems, the student will select an appropriate medium for each problem and justify his/her selection:

1. Drawing of a machine part for black-and-white printing
2. Drawing of cartoon figures for illustration on transparencies.
3. Large color illustrations showing different weather conditions (wind, rain, sun, snow).
4. A poster for an elementary-school class on eating the proper foods.

7. Drawing and measuring tools

   a. Rulers
   b. T-square
   c. Triangles
   d. Compass
   e. Templates

   (The use of these devices has been practiced in the Drafting component.)

8. Erasers and correction materials

   a. Gum eraser
   b. Kneaded eraser
   c. Erasing knife
   d. Correction tape
   e. Correction fluid
   f. Opaque white poster paint

   The student should become acquainted with all of these and use them as needed.

9. Adhesives

   a. Rubber Cement
   b. Masking tape
   c. Scotch tape
   d. Stapler and staple gun
   e. Pressure-sensitive wax from waxing machine

   The student should become acquainted with all of these. They will be used in Unit IV – Layout and Design.

10. Cutting tools

    a. Scissors
    b. X-acto knives
    c. Paper-cutter

    The student will demonstrate how to safely change a blade and how to sharpen a blade. The student will exercise proper safety procedures when using any tool.

11. Image sources

    a. Clip art
    b. "Morgue" or clip file
    c. Reference books

    The students will collect items for their own clip files from magazines, newspapers, or elsewhere. They should include examples of each kind of commercial artwork introduced in Unit I and images of objects, people, animals, plants, etc.

12. Transfer type and graphic aids

    a. Acetate toning sheets (benday)
    b. Acetate color sheets
    c. Decorative tapes and borders
    d. Lettering

    The teacher should introduce these items, but the actual practice with them can be deferred until later units.

13. Photo typositor

    a. Kinds
    b. Operation

14. Light table

15. Projectors and viewers

    a. Kinds
    b. Brands
    c. Operation

**Supplies Needed**

Sufficient supplies of all of the materials listed in this unit should be on hand to permit all students to gain practice in their use. In addition, students should purchase good-quality sketch pads and a variety of drawing pencils, brushes and pens.

## Unit III – Color

**Specific Objectives**

The student will demonstrate insights and abilities within the basic principles of color usage by producing original work in color, including

1. The color wheel
2. Color modifications
3. Color harmony
4. Color illusions
5. Color psychology

**Basic Content**

1. Definitions of terms
2. The color wheel
3. The gray scale
4. Modifying color
5. Combining colored lights vs. combining color pigments
6. Color harmony
7. Color illusions
8. Color psychology
9. Factors to consider in color selection

**Suggested Learning Activities**

Note: Many of the activities listed can be done by the student after class, either in the artroom or at home.

| Theory | Activities |
|---|---|
| 1. Definitions of terms | |
| a. Color spectrum<br>b. Hue<br>c. Intensity, saturation, chroma<br>d. Value or tone<br>(1) tint<br>(2) shade | The teacher will define the terms and show visual examples that illustrate these terms.<br><br>Using other teacher-supplied materials, the student will describe them, using these terms. |
| 2. The color wheel | |
| a. Primary colors<br>b. Secondary colors<br>c. Intermediate colors<br>d. Complementary colors | The teacher will show 2 or 3 examples of simple color wheels and explain how they are used.<br><br>The teacher will demonstrate how to mix paints on a palette.<br><br>With drawing and painting materials, the student will design and produce a color wheel (in any shape) of at least 12 wheel hues: the primary, the secondary, and the intermediate. |

e. Color families

The student will identify various color families and make a list showing the complement of each hue on the color wheel. For example,

red (primary ) – green (secondary)
blue (primary) – orange (secondary)
blue-green (intermediate) – orange-red (intermediate)

3. The gray scale

a. Definition of achromatic color
b. Review of definition of value

The student will paint two gray scales:

1. The first scale will consist of a long strip divided into equal-sized rectangles. It will show an even, step-to-step progression from black to white. If proportionate mixing of the paints does not result in a *visually* even progression, then the student will alter the paint proportions so it is visually correct. Application of the paint should be smooth and opaque.

2. The second scale will not be divided into rectangles. Instead, the student will *blend* each achromatic color into the next. This can be done by using washes or by scumbling.

The student should work on both scales at the same time so he/she can use the paint mixtures from scale #1 for scale #2.

c. Use of different media
(1) paint
(2) pencil
(3) India ink
(4) charcoal
(5) crayon or cray-pa

The student will also make gray scales of the second type above, using all the other media listed. In using crayons, he/she should make a scale once with just black crayon, and once combining black and white crayons. He/she should experiment with the various ways of blending and fading out each medium. (This activity can coincide with the section in Unit V, Basic Drawing, Number 1.f (5) – Shading or chiaroscuro.)

Note: These scales may be created on one large paper so the student can readily compare them. Students should also compare theirs with their fellow students'.

4. Modifying color

a. Adding black, grays, or white to a hue

(1) Changing value

(a) tint

(b) shade

The student will select a hue and paint a 9-step value scale of that hue, progressing evenly from dark shades to light tints. He/she will do this by adding black, grays, and white to the hue.

(2) Changing intensity

Using student and other examples of value scales for different hues, the teacher will point out the change in the intensity of a hue as related to the change in its value. The student will compare value scales of different hues, and determine which hues have a greater intensity at low value and which have a greater intensity at high value.

The teacher will indicate how value – and only value – shows up in black and white reproductions of color images. Given examples of color pictures, the student will select those pictures that will reproduce best in black and white, and point out possible problem areas due to lack of value contrast.

b. Mixing hues

(1) Mixing colors of the same color family

Again using rows of rectangles, the student will paint:

1. A series of hues made by mixing varying proportions of any two hues, except complements. There should be enough steps so that when viewed from a distance, the hues will appear blended.

(2) Mixing complements

(a) to neutralize

(b) to darken

2. A series of hues made by mixing two pure complements.

3. A series of hues made by mixing two complementary tints.

The student will describe what happens when two complements are mixed. He/she will paint examples of a hue darkened with black and the same hue darkened with its complement, and compare the effect on intensity.

Using the same problems, the student should experiment with mixing various other color media, such as pastel, crayons, pencils, and inks, and compare results.

5. Combining colored lights vs. combining colored pigments

   a. Combining all the colors of the spectrum
      (1) results using light – white light
      (2) results using pigments – black

   b. Color mixing in T. V.

The students can make simple disk-type tops, to be spun on a pointed stick or spun by a small motor or turntable, using 2 different colors on each disk to discover what the combination of colored lights produces.

6. Color harmony

   a. Monochromatic

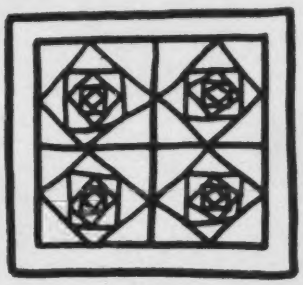
   b. Analogous or related

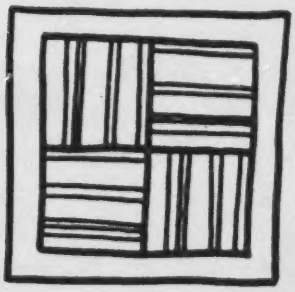
   c. Complementary or contrasting

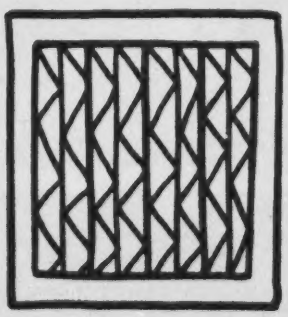
The student will locate and collect examples of color harmony from advertisements, wrappers, brochures, fabrics, etc.

The student will illustrate the different approaches to color harmony by doing the following:

1. On good paper or the board that was prepared with gesso (Unit II, Tools and Materials, Topic 6), draw a large square, leaving at least a 2" border. Divide this square into 4 equal parts.
2. Break the 4 parts into identical designs or patterns. This can be done by simply drawing identical grids or stripe patterns, or by arranging geometric shapes in a symmetrical or radiating pattern. The teacher may show examples, or the student may use a simple design that he/she has seen. The student should now have a large square with 4 repeated designs.
3. Each design will be painted to illustrate a different approach to color harmony:
   a. In one quarter, the student will illustrate a monochromatic harmony.
   b. In the second quarter, an analogous color harmony.
   c. In the third quarter, a contrasting color harmony.
   d. In the fourth quarter, a repetition or combination of any of the first three.







The color illustrations can be placed in any order. For optimum results, the student should not only try to harmonize each quarter, but also unify the whole composition through careful color selection and position. The student should incorporate into this problem the design principles previously learned.

d. Practical applications in media field

The class will discuss applications where the different types of color harmony are appropriate, for example, on posters, displays, graphs, etc.

7. Color illusions

The teacher will illustrate each of these categories with simple color examples* and with art examples that show how the categories can be applied to commercial art.

a. Depth
(1) Shading and highlighting
– light source

The teacher may choose from among the following student activities. (The students may use paint, construction or color-aid paper, or other suitable medium.)

1. Reviewing the value scales made earlier, the student will indicate where the light source would have to be if these value scales represented light and shadow.
2. Using color, the student will shade several of the line sketches drawn in Unit V, topic 1f, Space, using a different medium for each.
3. The student should also illustrate a surface that ripples, with wide ripples and with narrow ripples. The class should view and discuss examples of this form of optical illusion.

(2) Figure-field relationships
– colors that recede and come forward
– figure-field reversals

4. Using black and white construction papers, the student will place one letter of the alphabet on a square page so that the page is about 50% black and 50% white and illustrates a figure-field reversal. (Some letters will work better than others: N, S, O, M, W, X. . . .) Using the same letter, he/she will alter the proportions of black to white to about
75% – 25%
and 95% – 5%

* An excellent variety of color illusions may be found in "Interaction of Color", by Joseph Albers, Yale University Press, New Haven, 1963.

The student will determine how altering the proportions of black and white can affect the figure-field relationship.

5. Using colors and a letter as in #4, the student will illustrate:
   a. a figure-field reversal
   b. a color that recedes and a color that advances.

   The teacher and students will discuss the effect that a color's mass and shape have on the figure-field relationship. The teacher should show examples that effectively illustrate this.

b. Distorting the perception of hue, value, or intensity.

6. Observing his/her hue and value scales, the student will point out the areas in which the same color seems to change due to the contrast with its neighboring color.

(1) Caused by surrounding color

7. Using color aid paper, the student will illustrate how one color can appear to be
   a. a different hue
   b. a different value
   c. a different intensity
   depending on the surrounding color. The student will illustrate each of these by placing 2 small squares of the same color in the centers of two large squares of different colors.

   The student will also illustrate how 2 different colors can appear as though they are the same color, depending on their surrounding color.

(2) Caused by color proportions

8. Using one of the examples from #7 (a, b, or c), the student will vary the proportions of the colors by enlarging the small squares until they no longer appear to be different.

(3) Caused by lighting conditions

9. The student will observe the color illustrations from #7 in daylight, incandescent light, and fluorescent light, and note their change.

c. The perception of size as related to color.

10. Shown a black square and a white square of equal size on a page, the student will select the square that appears larger. The student may also illustrate this phenomenon using various colors.

d. Creating the appearance of transparency

11. The student will create a logo design using overlapping letters that appear to be transparent.

e. Creating the appearance of certain colors that are not actually present.

12. The teacher will show examples of pointillist paintings and color reproductions that use the dot or line method and indicate how the human eye can mix colors.

Using two colors, the student will illustrate three ways to apply paint so that the human eye perceives a third color when viewed from a distance.

f. Movement
(1) After-image

13. The student will experience the phenomenon of after-image by gazing at an intense red square, then looking at a white paper where he/she will perceive a green square (red's complement). The teacher and students will offer examples of when this phenomenon might be desired, and when it should be avoided.

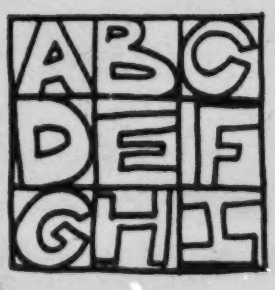
(2) Vibration

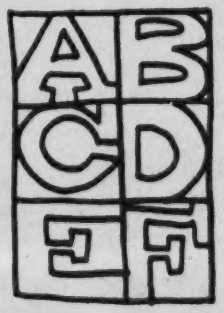
14. The teacher will show examples of Op Art that use vibrating color.

The student will create a simple design using stripes, circles, or triangles, with color combinations that vibrate or blink.

(3) Contrast

15. Using effective examples, the teacher and class will discuss how color contrast can lead the viewer's eye through a picture or sign.




The student will demonstrate and experiment with his/her knowledge of color in the following activity:

a. He/she will draw a design using at least 6 consecutive letters of the alphabet arranged in a grid so that each box is filled with one letter. Each letter should touch the perimeter of the box on at least 2 sides; the letters should be thick, although the actual width can vary; they can be straight or slanted. The teacher will show the student some examples for ideas.

b. These designs will then be painted to illustrate at least two of the illusions that colors can create. The student should note what happens to the visibility of each letter – if it becomes very clear and readable, or if it becomes camouflaged. He/she should be attentive to the whole design, striving for a color harmony that will lead the viewer's eye over the entire page. The class should critique.

8. Color psychology

a. Color symbolism

(1) Emotions

The class will discuss how color is often used to symbolize or exemplify an emotion, an atmosphere, or a cultural element. The teacher will show examples of color symbolism. (This discussion can coincide with the section in Unit V, Basic Drawing, Topic 3e, Cartooning.)

(2) Atmospheres or moods

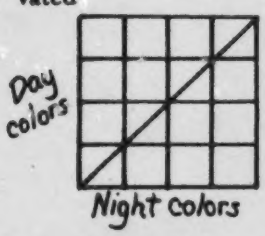
(a) Temperature – warm and cool colors

(b) Time – of day or year

(c) Motion – Calm or activated

Using a simple grid design (or other simple design) that is divided in half, the student will illustrate 2 or 3 of the following comparisons through color:

day – night
psychedelic – dull
baby – teenager
calm – active
hot – cold
spring – autumn
happy – sad
royalty – peasantry




(3) Cultural symbols

(a) Colors that indicate age groups

(b) Colors that indicate social position

(c) Colors that direct movement (as with traffic lights)

(d) Colors used for different seasons and activities

The class will discuss what colors are often used for different age groups, for royalty, churchmen, nationalities, weddings, funerals, etc., etc.

b. Color preferences

(1) Of cultural groups

(2) Of age groups

(3) Of various personality types

The class will discuss how color preferences can actually be symbolic of a person's or culture's self-image or desired image. The students will consider what the color preferences would be for the following:

a. a culture in the tropics
b. a Victorian society
c. a "hippie" counterculture
d. an elderly dignitary of very conservative views
e. a street walker
f. yourself

(For another activity which involves color preferences, see Unit V, Basic Drawing, Topic 4, Lettering.)

9. Factors to consider in color selection

   a. Center of interest
   b. Nature of audience
   c. Readability
   d. Attention factors
   e. Psychological factors

Given several hypothetical problems, the student will list all the factors that should be considered when selecting colors. For example:

Problem – What factors should be considered for simple arrows on the schools walls to guide visitors from the main office to the auditorium?

Ans. – 1. Color of the walls
2. Light conditions

Problem – What factors should be considered for a sign on the roadside to attract motorists to a bakery shop?

Ans. – 1. Attention-getting color needed
2 – Must be easy to pick out and read main points
3 – Color should be appetizing

Guided by the teacher, the student may produce any colored signs or simple projects needed by the school or other organizations.

As a problem which stresses both color and 2-dimensional design, the student will create a compact bumper sticker that attracts attention and is understandable from normal driving distance. It can consist of a simple symbol or of 1 to 3 words (e.g., "Love", " "Stop Pollution," etc.) The design may use a figure-field reversal as long as it conveys the *feeling* of the message when seen either way.

**Equipment and Supplies Needed**

Drafting tables and drafting equipment
All the supplies mentioned previously

## Unit IV – Layout and Design

**Specific Objectives**

The student will demonstrate expertise in the field of design and layout by performing the following to instructional standards:

1. Produce an assortment of well-thought-out and -executed designs using various graphic media.

2. Produce a series of layouts, from simple letterheads to complex brochures.

**Basic Content**

1. Layout materials and their function
2. Principles of two-dimensional design
3. Layout procedure
4. Lettering and type
5. The mechanical layout or final paste-up

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Layout materials and their function | |
| a. Drawing and measuring tools required | The teacher will introduce all these materials and describe their function with the aid of illustrations. |
| b. Layout paper | |
| c. Tracing paper | |
| d. Cutting tools<br>(1) Scissors<br>(2) X-acto knife | With construction paper and newspaper, the student will practice using scissors and X-acto knife by cutting accurate geometric shapes (squares, triangles, circles, and long strips) of various sizes. The shapes should have smooth, clean edges and sharp corners. The student will also practice cutting away the background from images selected from magazines or newspapers. The student should practice until he/she has acquired accurate skill in using the scissors and X-acto knife. |
| d. Adhesives<br>(1) Masking tape<br>(2) Rubber cement<br>(a) Dry mounting<br>(b) Wet mounting | If the student has not learned the two methods of pasting with rubber cement, the teacher will demonstrate and the student will practice. The teacher will describe what a pickup is, how to use it, and how to make one. Students will use pickups as needed. |

| | |
|---|---|
| (3) Waxing machine | The teacher will demonstrate the use of the waxing machine. Each student will do at least one mechanical layout using this machine during the unit. |
| e. Pressure-sensitive type and graphic aids<br>(1) Acetate toning sheets (benday)<br>(2) Acetate color sheets<br>(3) Decorative borders and tapes<br>(4) Lettering | |
| f. Readily available images<br>(1) Photographs<br>(2) Clip art<br>(3) Copyrighted materials | The teacher will distinguish between readily usable photographs or clip art, and those which need permission because of copyright. He/she will also explain how copyrighted material can be altered so it can be legally used.<br><br>The student will draft a letter to a publisher asking permission to use a particular illustration in a book. He/she will write the credit line and attach it to the illustration for use during the layout procedure. |
| 2. Principles of two-dimensional design | |
| a. Symmetry and asymmetry<br>(1) Central axis<br>(2) Mirror image | Shown various designs, the student will determine which are symmetrical and which are asymmetrical. |
| b. Balance<br>(1) Kinds<br>(a) Formal<br>(b) Informal | The teacher will show illustrations of formal and informal balance, first using the simple seesaw method, then illustrating further with examples of layout design. |
| (2) Defining positive and negative space. | The teacher will illustrate positive and negative space with examples.<br><br>The teacher will also present examples of reverse printing inside for emphasis. |
| (3) Altering the weight of positive or negative space by changing:<br>(a) Size<br>(b) Shape<br>(c) Color contrast<br>(d) Position on page<br>(e) Direction | The teacher will point out how a change in size, shape, contrast, etc. of a positive or negative space can alter its weight, and therefore affect the balance of a design.<br><br>The teacher will exhibit a simple layout for an advertisement or book cover that contains some bold title words, some subtitles, smaller typed information, and a simple image. |

Example:

Given black, gray, white and one color of construction paper, and assorted body type or newspaper printing, the student will translate this layout into simple geometric shapes. The student will then create differently balanced layouts. He/she may divide or combine shapes, or add background shapes; however, there must be a place for all the information that was in the original layout.

The student will make 3 different formally balanced compositions and 3 different informally balanced ones, altering them by changing the size, shape, contrast, position, or direction of positive and negative shapes.

(4) Psychological feeling caused by each type of balance

The class will view the illustrations of formal and informal balance and discuss the feelings that each kind gives, such as dignity, orderliness, strength, curiosity, excitement, etc.

c. Contrast – created through:
(1) Size
(2) Shape
(3) Color or value
(4) Style (angular, fluid, sketchy, detailed)

The student will locate 3 examples of graphic communication and name the ways that contrast has been created and why.

(5) Pattern

The student will create an instructional poster about pattern consisting of:

a. examples of patterned materials cut out of ads

and/or

b. sketches of simple patterns

and

c. the word PATTERN

These will be arranged in an attractive design, perhaps even making the overall design resemble a pattern in which the patterned materials are placed.

d. Emphasis – used for:

(1) Directing eye movement

(2) Stressing important points

Given a very plain handout of typed copy, the student will use pressure-sensitive aids to quickly emphasize centers of interest and direct eye movement. He/she will do one in black and white only, and one using color.

The student should be careful that:

a. Letters are not obliterated by a too-powerful or too-dark overlay.
b. Intensity of colors does not interfere with the legibility of underlying words or cause eye strain.
c. The contrast is not so light that it will appear as an accidental smudge or shadow.
d. All edges and corners are sharp and clean.

Given a simple black and white line drawing, the student will use benday to tone areas so they stand out and add contrast.

The teacher should point out areas that could present problems when reproducing and how these can be avoided.

e. Movement

(1) Using rhythm

(a) Repetition
(b) Progression
(c) Transformation

(2) Using lines as vectors

(3) Using numbers

(4) Positioning of the eye-catching or message elements

(5) Using contrast

The student will create an instructional poster about rhythm. Consulting examples of rhythm found in pictures or nature, the student will sketch rhythmical lines or patterns on a large paper, using black chisel-point markers or soft pencils. He/she should try to arrange the rhythms into a balanced, dynamic design. There should be dark areas and light areas to provide contrast. (This activity coincides with Unit V, Basic Drawing, topic 1e, Rhythm).

Using cut or torn papers and drawing media to create a series of simple images, shapes, or letters on a large sheet of paper, the student will illustrate a progression or transformation. For example:

a. A square changing into a circle, changing into a square . . .
b. An egg cracking open and whatever is inside coming out
c. One letter changing into another letter

d. One cell in a box dividing and multiplying into many cells until they fill the box and then ooze out of the box.
e. A plant growing and blooming

The images should be kept simple. They may be taken from clip files or other idea sources. The steps should be arranged so as to lead the viewer's eye through the proper order. Numbers or lines may be used to direct the viewer's eye; however, they should be incorporated into the design.

f. Depth

(1) Diminishing size
(2) Perspective
(3) Overlapping
(4) Color or value contrast
(5) Geometric solids

The student will locate 5 examples of layout design, each showing one of the methods for creating depth. If an example cannot be found, then the student will sketch a rough illustration. (This activity coincides with Unit V, Basic Drawing, topic 1f, Space or depth.)

Given various layout design problems that refer to depth in some way, the students will solve them by making quick sketches that use the various devices for creating depth. Examples:

1. A logo for a restaurant called The Lunch Box.
2. A sign for a discotheque named Down the Tracks or Up Front.

It should be emphasized that the student is concerned with the general layout design, and need not produce a finished layout.

g. Proportion

(1) The interior structure of a page
    (a) Central axes
    (b) Diagonal axes
(2) The line of golden proportion

Given a boldly printed book title and a blank page, the student will find the line of golden proportion and correctly paste the title over this line.

| | |
|---|---|
| (3) Harmony of shape | The student will create two covers for a brochure, using lettering only, where the shape of the elements<br>(1) conflicts with the shape of the page,<br>(2) harmonizes with the shape of the page, and compare the two. |
| (4) Effects created by the relationship of the design elements and the dimensional proportions of the page:<br>(a) Elements placed in the center of a page give a dull and static feeling.<br>(b) A long element placed equidistant from the top and bottom of a page tends to break the design in half.<br>(c) Elements placed off center help to create movement and enliven the design.<br>(d) Elements too far off center lead viewer's eye off the page – which may or may not be desired. | Using collage materials, the student will create a simple design that is static because of proportional relationships, and then, on another page, alter the design to give it movement and interest. |
| (5) Margins and borders<br>(a) Single-page<br>(b) Folded or multi-page | From this point on, the student will lightly draw correct margins for all work done. |
| h. Unity | The student will review his/her past work and determine if each is unified, or how the unity could be improved. |
| (1) Through style | |
| (2) Through shape | |
| (3) Through tension<br>(a) Objects in the center of a page are at a point of balance and will appear passive and non-moving.<br>(b) Objects placed off center create a pulling force between the imagined center and the sides of the page.<br>(c) Objects placed off center and on the diagonal axis create a pull between the corner and the imagined center. | On the white paper, the student will draw six 2" by 2" squares, separated from each other. Using black circles about ¼-inch across, the student will place them within the squares to illustrate each of the six points under tension. (There should be one circle in each square to illustrate a, b, c, and d; two circles to illustrate e, and two or more to illustrate f.) |

(d) Objects running off the edge of the page may create the feeling that the object continues moving beyond the edge.
(e) There is an attraction between two or more objects when they are placed within a certain distance of each other.
(f) Two or more objects may appear to repel each other or seem to move apart when placed farther away.

(4) Through color

Referring to teacher-supplied examples, the class will discuss how color can be used to help unify a layout design.

In order to fully recognize the interrelationship of two-dimensional design elements and to aid in developing a sensitive eye for design, every day the student should select an advertisement, wrapper, brochure, book cover, etc. and write a critique of its design in brief phrases. These can be kept in a special folder.

3. Layout procedure

a. Preparation

(1) Analyze the message
(2) Clarify function of layout
(3) Consider nature of audience
(4) Decide on size and materials required for the particular reproduction process.

Given specific layout projects, the student will follow this procedure and complete each step until he/she has created the mechanical layouts. After completion, the student will mount the thumbnail sketches, the rough sketch, the comp, and the mechanical together for review and critique by the teacher and class.

b. Assembly of elements which make up layout

(1) Images
(2) Copy

Note: The layout projects can be hypothetical or actual projects needed by the school or an organization. They should be job-related, and vary in degree of complexity.

c. Sketching the layout

(1) Thumbnail sketches
(a) Develop several ideas
(b) Explore layout possibilities

The student will complete at least 10 layouts, progressing from the simple ones to the more complex.

(2) Rough sketch

(a) Select the best thumbnail sketch

(b) Enlarge until closer to actual size of finished layout.

(c) Refine images, proportions, and placement of elements.

(d) Indicate bold type by darkly shaded areas, and small type by lightly shaded areas.

Examples for layout projects:

a. Letterheads
b. Envelopes
c. Business cards
d. Invoices
e. Tickets to events
f. Membership cards
g. Single-sheet handouts
h. Multi-sheet or folded handouts
i. Newspaper and magazine advertisements
j. Brochures

d. The comprehensive layout

(1) Draw layout to actual scale of finished product.

(2) Finish refining images, proportions, and placement of elements.

(3) Accurately outline the actual size of all type, using point scale.

(4) Choose type style (see topic 4 below, Lettering and Type).

(5) Develop any overlays for tone separation or the writing of specifications

(6) Write any instructions for the printer on the margins of the comp or on an overlay.

(a) Size, color and kind of paper
(b) Color of ink
(c) Number of copies

The teacher should make available a supply of images (ready-made clip art and/or images cut out of magazines, newspapers, etc.). The students should be encouraged to use these ——

a. By tracing roughly
b. By altering or adapting
c. As sources for other possibile ideas

e. Image generation

(1) Artwork

(a) Qaulities needed for reproduction

(b) Qualities needed for enlargement or reduction

The teacher and class will discuss the necessary qualities that artwork must have if it is to be reproduced, enlarged, or reduced. The teacher will show examples of original artworks and their reproductions, and point out problem areas where lines or patterns fill in, value gradations fail to show up, thin lines become broken, etc. The class will discuss how these problems can be corrected. The student will be alert to the need to correct poor quality artwork by darkening, lightening, strenghtening lines, etc.

| | |
|---|---|
| (2) Photographs or halftone copy<br>(a) Qualities of suitable half-tones | The class will review the necessary qualities of a halftone for it to be suitable for reducing, enlarging, and/or reproduction. |
| (b) Retouching<br>–airbrush<br>–pencil<br>–paints and brush | (See Unit V, Basic Drawing, topic 3a, Airbrush rendering, which coincides with this section)<br><br>Using teacher-furnished photographs, the student will retouch damages or blemishes and strengthen small areas by using a pencil and/or paint. |
| –the bleach process<br>–the wash process | The student will retouch a photograph using the bleach or wash process to eliminate unwanted portions. |
| (c) Marking techniques for cropping halftones | The teacher will explain and demonstrate how photographs must be marked in the margins if only a section is going to be used.<br><br>The student will demonstrate how to determine the desirable area of a photograph and how to properly mark it for cropping without damaging the photograph for other uses. |
| (d) Outlining or silhouetting | The student will demonstrate how to outline or silhouette an image so it can be separated from the rest of the photograph and be placed on a plain white background. |
| f. Scaling methods for enlarging or reducing artwork to fit into layout<br>(1) Mechanical methods<br>(a) Camera lucida<br>(b) Pantograph<br>(2) Ratio and proportion method<br>(a) Mathematical<br>(b) Geometrical – diagonal of rectangle | The enlargement or reduction of artwork will be computed for use in at least 3 of the 10 layouts. |
| g. The mechanical (see topic 5 below) | |

4. Lettering and type

a. Hot copy
   (1) Foundry
   (2) Monotype
   (3) Linotype, intertype, or ludlow

b. Cold copy
   (1) Strike-on (typewriter)
   (2) Photo-type
   (3) Transfer letters

c. Types of fonts and the feelings they convey
   (1) Style
   (2) Width
   (3) Weight

d. Sizes of type—point system

e. Copyfitting
   (1) Spacing letters and words
   (2) Leading between lines

Review of topic.

The student will use knowledge and skills acquired in this area through other courses when creating layouts.

5. The mechanical or final pasteup

a. Assemble all completed images, type, and graphic aids

b. Prepare layout paper by drawing guidelines with blue pencil

c. Crop any unwanted areas on images or type.

d. Bleed necessary areas.
   (1) Overhand image
   (2) Make sure no important parts or letters are too close to border.

e. Pasteup
   (1) Cement the elements, using the dry- or wet-mounting method for rubber cement, or the waxing machine.

   (2) Check the position of the elements and square.

   (3) Apply pressure

   (4) Remove excess cement with a pickup

The student will complete the various projects he/she has undertaken, following these guidelines. The student will make up dummies for any multi-sheet projects.

The student will determine when to use wet mounting and when to use dry.

The student will use the waxing machine for pasting up at least one layout.

f. Apply transfer graphic aids

g. Prepare and fasten any needed overlays for indicating tones or specifications

h. Check the mechanical for errors and possible problem areas and correct.

i. Protect the mechanical by flapping.

**Supplies Needed**

All the supplies mentioned previously.

A supply of images of various types, including photographs, as mentioned in outline. Some are to have specific defects for student analysis and/or repair.

Camera lucida and pantograph.

## Unit V – Basic Drawing

**Specific Objectives**

The student will demonstrate effective attainment by performing the following to instructional standards that take into account different individual abilities.

1. Use various types of lines in drawing work.
2. Create depth where required.
3. Demonstrate insights into the principles of design and apply these insights.
4. Create well proportioned images.
5. Express specific ideas and emotions through drawings.
6. Use appropriate media and styles.
7. Draw the human figure in both realistic and exaggerated styles.

**Basic Content**

1. The elements of drawing
2. Drawing procedure
3. Styles and media
4. Lettering
5. Specific drawing problems

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. The elements of drawing | |
| a. Line | For the following exercises, the student may work with his paper on a horizontal, slanted, or vertical surface. The student should have enough space to stand and move around unhindered. Each exercise will be done first in pencil, then in black chisel-point marker, and finally in a medium of the student's choice: crayon, brush and ink, charcoal, etc. The student will use different ways of holding the pencil, marker, or other media stick. The teacher should demonstrate each exercise first – not for the student to copy, but to give the student a feeling for the exercise. |
| (1) Characteristics of line | |
| (a) Width<br>(b) Weight<br>(c) Length<br>(d) Quality<br>(e) Energy<br>(f) Gesture<br>(g) Direction | |
| (2) Types of lines | |
| (a) Angular<br>(b) Curving<br>(c) Broken<br>(d) Combinations | |

(3) Direction of lines

(a) Moving in various directions on the plane of the paper

(b) Creating the illusion of moving backward or forward in deep space, overlapping, or intertwining

1. Use a very large sheet of paper so different areas can be used for the different exercises. Some may overlap. Think of line as a point moving through space, and as the pencil follows this point, it leaves a path. Standing up, move arms in circular motions, large and small. Close eyes and try to feel circular motion within the whole body. Once relaxed and loose, begin to draw a large, graceful, circular line. Use whole arm and body as the source of movement. Follow the line around itself several times, then curve it in smaller and smaller until the point rests in the center.

2. Sway body from side to side and back and forth. Swing arms in the same directions. Keeping a loose, swinging motion, draw a line horizontally across the paper. Before it reaches the other edge, change to a vertical direction. Without lifting the pencil from the paper, continue to draw horizontal and vertical lines that change directions at different points on the paper, overlap, and criss-cross. Move whole arm and body in the direction that each line takes. The motion should be effortless and gliding.

3. For the following exercises, choose relatively clear areas of the paper and outline them by drawing squares, rectangles, or circles. Working within these areas and following the same sort of approach as before, draw the following:

a. diagonal lines
b. circular and elliptical
c. wavering
d. swirling in different directions
e. light, curving slashes
f. hard, abrupt slashes
g. explosive lines, etc.

When one line runs into another, try letting it follow that line for a while before it moves away. Cover the whole page.

The class will discuss how the movement of a line originates within the artist's whole body.

(4) Feelings created by different lines

(a) by the line gesture or energy
(ex. – A fast, jagged line gives a feeling of unrest).

(b) by association
(ex. – A soft, fuzzy line suggests warm flannel).

4. On a new sheet of paper, the student will work in the same way as before, but concentrate more on the feelings that lines convey. The teacher will state various images and emotions, and the student will draw lines that show the movement, energy, or gesture that such images or emotions possess. It should be emphasized that the student does not draw the images, but translates their qualities into line. For example:

a. the swift flight of a bee
b. the movement of a feather, slowly falling
c. peace and quite
d. a massive, terrifying tornado

The teacher may ask the students to role-play by assuming different personalities and translating these into line.
Examples: timid, boisterous, strong, rigid, weak.

5. Using knowledge acquired from the previous exercises on line and from the section on balance, topic 2b of the Layout unit, the student will create a balanced composition using only line. He/she will use more control than in the previous exercises by considering the placement of lines in relationship to the balance of the whole composition. Again, the student will not be drawing images but will be translating feelings and energies into line. He/she should use a variety of lines and develop the entire page as a unit. Any one medium can be used.
A comparison of attributes can be chosen on which to base the drawing, such as hard-soft, curving-angular, weak-strong, flat-bumpy, flowing-broken, etc.

The teacher and class will review the exercise sketches (numbers 1–4 above) and the final drawing (number 5). They will discuss the line qualities and note if there is a difference between the spontaneous exercises and the controlled drawing. Did the controlled drawing lose the energy and gesture qualities of the previous sketches? If so, the student should redo some of the exercises from 1 to 4 until he/she feels comfortable and loose, then try exercise #5 again.

Since this drawing does not consist of a preconceived image, but rather emerges and grows as it is worked on, the teacher and class will discuss the question:
How does the artist know when his drawing is finished?

b. Shape

(1) Flat shapes

(a) Geometric

(b) Amorphous

(c) Combined

(2) Positive and negative shapes

Using pencil and paper, the student will draw as many different types of shapes as he/she can imagine. Each shape must be unique from the rest. This helps in building a student's "shape vocabulary." The student will experiment with flat shapes and compositional balance by making the following sketches. Line characteristics should always be considered and possibly varied for effectiveness. The student will define and develop the negative shapes as well as the positive ones. Sketches will be done in soft pencil and on 12" x 18" or 19" x 24" paper.

1. An arrangement of different sized and differently proportioned rectangular shapes, all parallel to an edge of the paper. The shapes should not touch each other, though they may come very close.

2. Same as above, only the shapes will be drawn with continous line and will touch each other.

3. Same as #2, but the rectangles will overlap as if they are transparent.

4. Same as #2, but the rectangles will be opaque and overlapping, thereby hiding parts of rectangles underneath. There may be rectangular holes in them.

5. Same as number 1, but using amorphous shapes.

6. Same as 2 and 3, but using various circular and/or curving, amorphous shapes.

7. The student will create a design using straight and angular stripes, of any widths, that interweave and lead the viewer's eye through and around the whole picture plane. The stripes may be vertical, horizontal, and/or diagonal.

8. Same as number 7, but with curving stripes or ribbons.

9. The student will draw an arrangement of irregular, wavering stripes that move vertically, by using pairs of wavering lines that oppose each other. The broad areas of the stripes will have curved openings (negative space) in them. The student will then draw a row of similar stripes that move horizontally underneath. Stress the need for simplicity, otherwise the design can become lost.

10. Same as 9, only try to make the amorphous stripes interlock like chain links.

11. Try the same idea as in 9 or 10, but using rigid, rectangular chains.

During these exercises, the student should experiment with different design arrangements, such as symmetrical, asymmetrical, and radiating designs, tightly controlled designs, and loose and spontaneous designs. The teacher and student will discuss how well line quality and balance have been incorporated into these sketches, and also whether the student is exploring many different possibilities.

(3) 3-dimensional forms

(a) Planes in space
(b) Bending planes
(c) Intersecting planes
(d) Geometric solids
(e) Modified solids
—irregular
—cutaway
—hollow
—with holes in
—cross-sections
(f) Combined solids
(g) Intersecting solids
(h) Transparent solids

The teacher and students will discuss what they have learned in the drafting component about 3-dimensional forms.

Using pencil and with individualized help from the teacher, the student will fill different pages with the 3-dimensional forms listed. All forms should first be sketched lightly as transparent forms, then the outside lines should be strengthened. The forms should be at different tilts or angles to the viewer. Building blocks or the cube constructions under the Visual Display Unit might prove helpful in picturing these forms. After a form is completed, the student will use parallel or cross-hatched lines to further define the form. This is not to be used as shading; instead the lines should follow an entire plane or curved surface, in such a direction as to emphasize the shape of the object. These sketches will be used as reference material for later drawings.

| | |
|---|---|
| c. Texture | |
| (1) Created by different surfaces | If not already explored under Unit II, Tools and Materials, then the student will feel the textures of different papers and run some various media over the paper's surface to see the visual effect. The class will discuss the feelings that are produced by these textures and relate them to specific images. For example, a bumpy stipple board with crayon rubbed over it gives an irregular, dotted effect that could be used to draw a hazy or snowy landscape. A few examples of artwork illustrating this should be shown. |
| (a) The paper's surface | |
| (b) The surface under the paper | The teacher will demonstrate how rubbings can be produced from various objects (manhole covers, gravestones, combs, brick, coins, etc.) and with various media (pencil, graphite bag, wax, charcoal) in order to produce a visual texture or a print of the object.<br><br>Using thin paper and any suitable medium (one color), the student will create two compositions with rubbings. One will be purely design: using either rubbings alone, or using rubbings and drawn lines or shapes. For the other composition, rubbings of objects and textures will be arranged and combined with drawing to create an image: perhaps a landscape found on another planet, or a fantasy creature with coil eyes, comb fins, wood-grained skin, and a saw-blade tail. |
| (2) Created by line<br><br>(3) Created by shape | The student will divide a piece of drawing paper into 2" squares, leaving a border around the edge of the paper. He/she will fill each square by drawing a different texture with lines or shapes. The student should observe the textures around him/her and think of other textures to translate onto paper. The student should work the whole page as a unit so he/she can balance the arrangement. This activity should be done at least 3 times in black and white, using different media, such as pencil, marker, charcoal, crayon, pen and ink, etc. |
| d. Pattern | (See activity under Unit IV, Layout, 2c, Contrast.) |

(1) Placement of elements

(2) Similarity of elements

Using one of the previous drawing sketches from b, Shape, exercise number 1 or 5 (in which shapes were arranged so they are not touching), and any black drawing medium, the student will fill each shape with a pattern, trying to keep the arrangement balanced while also attracting and holding the viewer's eye as it is led from pattern to pattern.

e. Rhythm

(1) Repetition
(2) Progression
(3) Transformation
(4) Patterned movement

The student will create an instructional poster about rhythm. For procedure, refer to Unit IV, Layout, topic 2e, Movement, which coincides with this section.

The student will select a poem, a very short story, a joke, or lyrics from a song. He/she will create a rhythmical composition that expresses his/her selection by copying the selection in expressive script handwriting and using this handwriting for the lines in the composition. As an example, the lyrics to "Love Makes the World Go Round" can be written in very swirling, flowery script that curves around and around and then inscribes a heart shape in the center. The script can be repeated over and over until the composition is completed. The student should choose a black drawing medium, such as pen and ink or marker, that is most suitable for expressing the feeling of the selection.

f. Space or depth

(1) Creating depth with linear rhythms

Holding a chisel-point marker so the wide edge remains parallel to the bottom of the paper, the student will draw angular and curving lines. He/she will try rotating the marker in his/her hand from the thick edge to the thin edge and back while drawing several vertical lines. These lines should have varying thicknesses and look as though they are ribbons twisting in space.

Given carbon paper on top of smooth typing paper, the student will use a comb to draw many parallel lines by pulling the teeth of the comb across the carbon paper. The student will experiment with waving the lines by moving the comb from

side to side as it also moves downward, and with rotating the comb in swirling, curving motions. This will create, on the paper beneath, a linear rhythm that has the illusion of twisting and turning in space. The student will observe how the lines get closer or further apart, and how this causes a spacial illusion.

Without lifting a black chisel-point marker from the paper, the student will write his/her initials in a rhythmical design. The student will go over the initials 5 or 6 times, with each line following the one next to it – sometimes closer, sometimes farther, and sometimes crossing over at certain points. The desired result is to create the 3-dimensional quality in drawing that the comb produced.

Using any writing medium and a large sheet of paper, the student will distort the flat, 2-dimensional surface of the paper by using lines that move parallel to each other across the paper. Each line will follow the line drawn before, gradually exaggerating or diminishing any ripple or bump, and thereby creating the illusion of a bending or rippling surface. If the student can imagine any other way of distorting the surface with lines, he/she should experiment with it.

(2) Overlapping

(a) Opaque
(b) Translucent
(c) Transparent

Using line only, the student will sketch a cube that appears opaque, then one that appears translucent, and finally one that appears transparent.

(3) Diminishing size

(a) Objects that get further away from the viewer appear progressively smaller.

(b) Spaces between the objects appear smaller as they get farther away.

Using the techniques of overlapping and diminishing size, the student will create a design using 3 to 5 arrows that move through space, bend, wrap around each other, twist, etc. The arrows should have width, they may be planar or solid, and they may be black and/or white. The arrowheads should help direct the viewer's eye.

The teacher will show examples of how an illustrator draws and uses arrows to show movement in space, such as the direction a knob or screwdriver turns, and also how to use press-on arrows so they appear to move around an object or through space.

The student will illustrate an arrow that appears to move fast around a cylinder, and one that appears to move slow. He/she will then draw many geometric or amorphous solids that vary from large to small, and then practice drawing or applying appropriately sized, spaced, and placed arrows that move fast and slow around the solids in different directions, as if showing someone how to wrap strings around them.

(4) Perspective

The teacher and students will briefly review the areas of perspective that were covered in the drafting component.

(a) Viewing angle

(b) Location of horizon

The student will sketch a thin cylinder, such as a coin, in a step-by-step progression as it spins around on its edge, showing the various viewing angles. The student will draw this once freehand, and once using elliptical templates.

The student will use overlapping, diminishing size, and changing angles to draw a long series of rectangles that appear to be falling down through space as seen from above.

The student will cut about four long strips of paper. He/she will fold and bend some of the strips in different directions, and curl the other strips. The student will sketch these strips from different viewpoints, trying to capture the image of long planes curving and bending in deep space.

Using building blocks for reference, the student will sketch various constructions made from geometric solids by combining, modifying, and intersecting the solids. He/she can consider these to be structures for space stations, castles, cities, etc. The student should begin making constructions with just one basic shape or module, than progress to combinations. He/she should concentrate on creating a feeling of solidity and keeping a consistent viewpoint. Structural lines following the contour of the surfaces should be added. Note: This is *not* a perspective drawing with vanishing points.

(c) One-point perspective

Placing the vanishing point in the center of the page, the student will draw an arrangement of flat shapes (which may overlap) around and at different distances from the vanishing point, and then draw lines from the shapes to the vanishing point. The student will convert the original flat shapes to solid forms of different depths with the help of the lines to the vanishing point.

The student will draw the interior of a box 3 times in one-point perspective, each time placing the vanishing point in a different position. He/she will draw various types of windows and doors on the walls of the boxes, and then add arrangements of cylindrical columns, boxes, cones, etc. in perspective within the boxes.

The teacher will show examples of surrealistic drawings (e.g., DeChirico, Dali, Ernst, Margritte) and dream images.

(d) Two-point perspective

The student will letter words or a title in solid block letters, once using one-point perspective and once using two-point perspective. He/she should try both vertical and horizontal rows of letters.

Using two-point perspective, the student will sketch a city or town block (or part of one) or a futuristic environment showing various sizes and shapes of structures, their windows and doors, patios and archways, the sidewalk and street, and trees or street lamps. The student will use only basic or modified geometric solids (for example, a tree would be a sphere on a narrow cylinder) and so form a varied arrangement of deep shapes and crevices. The student should not forget that structures may also rise up in the background.

Clip files or other resource material may be used to get ideas. Keep the drawing sketchy, leaving the lightly drawn guidelines. Do not attempt realism at this point – refining and detailing will be explored in topic 5.

| | |
|---|---|
| (e) Three-point perspective | The student will demonstrate 3-point perspective by drawing a simple arrangement of 3 basic geometric forms using this technique. The student will block-letter an appropriate word, such as TALL, SKYSCRAPER, or TOWERING, in 3-point perspective. |
| (5) Shading or chiaroscuro | (Note: This section coincides with Unit III, Color, topic 3, Gray scale.) |
| (a) Light source | In all the following drawings, the student will indicate the direction(s) from which the light comes with a small arrow in the margin. |
| (b) Techniques<br>–parallel lines<br>–cross-hatching<br>–stippling<br>–blending with stomps<br>–washes | The teacher will demonstrate different commonly used techniques of shading and show examples of artwork that use these techniques.<br><br>The student will cover a page with geometric shapes and practice shading them using these techniques. The teacher will point out how these methods are used to indicate the surface texture or material of objects (such as polished metal), to create depth and to highlight areas. He/she will advise students on where and how to leave highlights and use shadows. |
| (c) Highlights<br>–broken lines<br>–white lines or empty spaces | The students should closely study different drawings and take notes on the devices that artists use to show highlights, shadows, surface texture, depth, etc. He/she should save good illustrations, with notes attached, that point out any effective devices. |
| (d) Shading<br>–heavy lines<br>–dark areas | Given simple objects made from different materials (pieces of pipe, wood blocks, drinking glasses), the student will observe and draw each object with highlights and shadows so it illustrates the proper material from which it is made. The student will first draw each object lightly with pencil, then ink the drawing. |

| | |
|---|---|
| (e) Cast shadows | Using simple solid forms, the teacher will demonstrate how to determine the placement and shape of cast shadows.<br><br>The student will select 2 to 5 simple objects, arrange them in a composition with a strong light source, and create an ink drawing that shows highlights, shadows, and cast shadows.<br><br>Using 3 geometric drawings from previous exercises, the student will shade each drawing using:<br><br>a. soft pencil<br>b. ink washes<br>c. benday |
| (6) Detail and fuzziness | The student will make a simple sketch that illustrates how objects in the foreground are clear and more detailed than objects that are farther away. Some subject-matter choices:<br>a. Thousands of faces in a stadium<br>b. A field of corn or wheat<br>c. Trees in a forest<br>d. An aisle of food shelves in a supermarket |
| 2. Drawing procedure | |
| a. Defining and analyzing the message | (Refer to Unit I, topic 3a.)<br><br>The teacher or student will select a *simple* drawing problem that can be adapted to the various drawing procedures. |
| b. Designing the visual image | The student will solve the same problem using at least 3 different approaches. For example, drawings of various carpentry tools are needed for a book cover on carpentry. They may be arranged in rows or in a designed composition. They may or may not be realistic, but they should clearly communicate the message of carpentry. |
| (1) Obtaining the visual idea | (Refer to Unit I, topic 3b) |

| | |
|---|---|
| (2) Collecting and observing subject matter for the idea<br>(a) actual objects<br>(b) pictures | The student will obtain some carpentry tools from a school shop or elsewhere, and also locate some pictures of carpentry tools. |
| (3) Drawing borders for indicating sizes of sketches or drawings<br>(a) Freehand<br>(b) Using guiding hand along edge of drawing table<br>(c) Ruling with T-square and triangle | The student will draw borders on paper for sketching. |
| (4) Rough sketching stage<br>(a) Determining the viewpoint, depending on the function of the drawing<br>–for clear information<br>–for attracting attention<br>–for enhancement | After determining the possible viewpoints for the tools, the student will make rough sketches using each of the 3 approaches listed under (4) (b). |
| (b) Defining the subject matter<br>–making quick contour gesture sketches to get the feeling and placement of the subject matter. | |
| –making quick structural sketches using geometric solids as the foundation and a rod to obtain correct proportion | The teacher will demonstrate how an image can be broken down or built up with geometric solids and how to measure proportion. Given objects and pictures, the student will practice drawing the foundation for these by using only geometric solids and proper proportions. The student will also use these different approaches in later drawings. |
| –using a viewer or light table to trace and compose a rough sketch from one or more pictures. | |
| (5) Refined sketching stage | |
| (a) Picking the best rough sketches that are both simple and effective. | The student will pick the best sketches from each of the approaches above. |
| (b) Drawing borders to actual size of finished product. | Since the student will be creating 3 finished drawings in order to solve the problem in 3 different ways, he/she will have to repeat the procedure to the left 3 times. The student may work on all three approaches together, or he/she may choose one approach to work on, then go back and work on the second and then the third. |

(c) Determining the final method of drawing
- –by observation
- –from memory
- –from imagination
- –from copy

Note: It should be pointed out to the students that many of these decisions are made together and from the very beginning, and at times they are made rather unconsciously; however, it is necessary to organize and clearly define them so the student is aware of the various possibilities.

(d) Determining the style and media, taking into consideration ––
- –message
- –function
- –production methods
- –reproduction methods

Since this decision can cover so much, it has been treated separately later on (topic 3). Also, the topic of improving copy for reproduction will be taken up in Unit IV, Layout, topic 3e, Image generation.

The student should continue with the activity on carpentry tools, using knowledge acquired in the past.

(e) Making the refined sketch in pencil
- –drawing to finished size
- –refining structure, arrangement, proportions, lights and darks
- –drawing in chosen style (and possibly testing chosen media)
- –adding some details
- –checking to make sure it is an effective solution
- –making any notations to remember during final stage

The student will create 3 different refined sketches for the carpentry book cover. Before proceeding to the final stage, the student and the teacher will evaluate the sketches according to the criteria in Unit I.

(6) Final drawing stage

The student will create 3 final drawings for the carpentry book cover and flap them.

(a) Transferring the necessary elements from the sketch onto the final drawing paper in light lines.
- –using transfer sheet
- –using light table and tracing
- –doing an underdrawing

(b) Completing the drawing
–using final media
–adding all necessary detail
–checking for errors or weak areas and correcting
–checking for any problem areas in terms of reproduction, and correction of them.

(c) Flapping the final drawing for protection

(d) Writing any instructions for layout or reproduction considerations

3. Styles and media

Throughout this section, the class will discuss the interrelationship between media and style.

a. Airbrush rendering

(This topic can coincide with Unit IV, Layout, topic 3e, Image generation.)

(1) Parts and their function –
types of airbrushes
air supply
air-pressure regulator
air hose

The teacher and students will review categories (1), (2), and (3), which were introduced in the Drafting component.

(2) Care and storage

(3) Uses of airbrush
(a) Rendering of line drawings
(b) Photo retouching
(c) Use in artwork or visual display

(4) Techniques
(a) Freehand – no friskets
(b) Using friskets
(c) Using back-and-forth strokes
(d) Using left-to-right strokes only

The student will practice using the airbrush by completing some simple exercises, such as:

a. Making various lines, dots and patterns without a frisket.

b. Making a gray scale by using a frisket and making a block-by-block progression.

c. Making a gray scale with a frisket, by blending.

d. Filling 2 squares (about 3" x3") with even color, one by using back-and-forth strokes, and one by using only left-to-right strokes.

e. Filling squares with tones that go from dark on one edge across to light in the middle, and back to dark on the opposite edge.

(5) Procedure for rendering

(a) Produce drawing, using light pencil lines.

(b) Note light source

(c) Flap drawing for protection

(d) Set up equipment

(e) Use the frisket paper
- –adhering
- –cutting
- –removing

(f) Prepare and place the mask for protection

(g) Select and mix paint

(h) Prepare the airbrush

(i) Spray

(j) Remove frisket

(k) Accentuate as needed with lines.

(l) Clean the artwork

The student will prepare 5 accurate pencil drawings of various geometric solids and shade them, using the proper procedure for airbrush rendering. Poor renderings should be redone.

Using pencil, the student will lightly draw solid constructions consisting of modified and combined geometric solids such as those done under topic 1f (4) (page 219). The student will then shade the constructions, using airbrush.

The student will draw and make an airbrush rendering of one of the following:
a. A simple machine or machine part
b. A simple tool
c. A specific plant specimen
d. 3 arranged cans

(6) Procedure for photo retouching with airbrush

(a) Analyzing the problem. Airbrush needed to—
- –correct blemishes
- –remove or subdue areas
- –accent areas
- –make more attractive or eye-appealing
- –make suitable for a specific type of reproduction

The class will discuss when and how photographs need retouching.

Given a selection of photographs, the student will indicate the areas needing retouching, state why, and explain how (by lightening, darkening, toning down, etc.).

Given photographs and other halftones in need of retouching, the student will retouch the necessary areas, using the airbrush. (These photographs may be used in the layout problem in Unit IV, topic 3.)

The teacher will show examples of photocollage.

(b) Preparing the photograph
- –mounting the photo
- –cleaning the photo
- –flapping the photo
- –touching up small scratches or spots with a brush and paint to match the surrounding tone

(c) Retouching
- –applying frisket paper *(dry)*
- –cutting and removing areas
- –masking
- –spraying
- –using bond paper to cover areas already sprayed

(d) Protecting the retouched photograph

Using black and white photographs, the student will create a new picture by combining or changing them. Two or more photographs may be cut apart and assembled in a collage, and then airbrush rendering will be used to blend and unify them so they appear to have been photographed that way. Or, one photograph may be changed by adding or subtracting images (a hat on a head, a face with no mouth) with the airbrush. The student should use imagination and skill to make the finished product appear real and yet impossible, such as King Kong on the Eiffel Tower or a person with two heads.

(7) Using airbrush in artwork or visual display
- (a) to add background
- (b) to make borders
- (c) to color areas with flat, even hues
- (d) to stencil signs

The student will use a frisket and airbrush to apply a decorative border on a piece of mat board for use as a frame.

(8) Problems in using the airbrush and how to solve them.

The teacher will anlayze the student's airbrush renderings as the work progresses.

b. Technical illustrations

(1) Freehand (guided by hand alone)

(2) Semi-freehand (mechanical drawing aids are used for the underdrawing only)

(3) Mechanical

Using pen and ink, the student will make 6 well-executed technical drawings: two freehand, two semi-freehand, and two mechanical. The subject matter for these drawings should preferably be of an instructional nature and may be used for layout projects in Unit IV. The style of drawing must be appropriate to the subject matter.

c. Pictorial illustrations (representational illustrations that are not necessarily technical)
- (1) Line drawings
- (2) Scratchboard drawings
- (3) Brush drawings
- (4) Pebbled drawings using stippleboard
- (5) Charcoal drawings

Using the same choice of image (for example, a head, an animal, a plant, etc.), the student will create 5 well-executed drawings using the five different media listed.

d. Graphic designs

(1) Abstract or non-representational

(a) Transformed from a pictorial image

The student will sketch two graphic designs. For the first, he/she will distort and fragment a pictorial image until it is not at all realistic, but still representational and graphically aesthetic.

(b) Related to no pictorial image – pure design

For the second one, the student will continue abstracting the image until it changes into pure design, no longer representational, but retaining some of the qualities of the original image, such as texture, mood, structural elements, etc.

(2) Symbolic illustration

(a) Used to indicate a plan, organization, or structure

The student will organize and create a schematic illustration representing a family tree, a government structure, or a classification chart for some biological genus. This illustration can be done in pure design or with images. It may be done in any suitable medium.

(b) Used to symbolize a person, place, thing, or idea

The student will design and create a group of esthetic graphic designs that will serve as symbols, such as: tarot cards,(to suggest various aspects of life), symbols on traffic signs, simple representations for different trades or professions, etc.

e. Cartooning and caricature

(1) Basic elements of cartooning and caricature
- (a) Exaggeration
- (b) Simplicity
- (c) Stylization

(2) Determining the purpose of the cartoon
- (a) Deciding on gesture and/or emotion
- (b) Deciding on style

The students will examine various cartoon characters and discuss their purpose and the effectiveness of their styles.

(3) Sketching basic underlying structure and gestures

Using characters from a newspaper's comic page, the student will break down each character into its basic underlying structure.

The student will create an underlying structure for a cartoon character, using repeated geometric shapes for each basic part of the body, or simple lines for the body's skeleton.

Using only this underlying structure, the student will fill a page with the figure in various positions: sitting, slouching, stretching, jumping, running, squatting, crawling, etc. These positions should be made exaggerated and dynamic by squeezing, stretching, and pushing the parts of the figure beyond their normal abilities. Exaggerated foreshortening and perspective will be illustrated in these sketches.

(4) Adding facial features and expressions

The student will fill a page with different shapes, such as circular, oval, pear, oblong, etc. He/she will sketch a simple cartoon face in each shape, from different angles. The student should refer to examples of cartoons for ideas on variously-shaped noses, eyes, mouths, etc. When the student finds a suitable face, he/she will draw it many times from different angles and with different facial expressions. The expressions should be exaggerated, and the lines in the face should be drawn with feeling and energy. Each face is to be labeled with the emotion it expresses.

(5) Adding costumes

(6) Adding accessories

Using the page of figure drawings and other lightly drawn figures, the student will add the facial features and any costumes and accessories that will complete the characters: hats, canes, oversized clothes, undersized clothes, mustaches, etc. The student will continue sketching and exploring various combinations and characters.

The student will complete one large page of his/her best male cartoon characters, a page of the best female characters, and a page of the best animal characters.

(7) Detailing, color, or shading

Using examples, the teacher will point out how lines in and around the character aid in showing the character's movement and emotion: for example, a sweeping line indicates the movement of a baseball pitcher's hand through the air; or a jumble of frenzied lines around a character's head shows how confused and upset he is.

Using any color medium, the student will add color to the cartoon sketches, keeping color symbolism in mind. He/she will also apply the color in such a way as to reflect the emotion of the character.
For example, color could be applied in quick, spontaneous strokes on a very active character, while a sleeping character would be carefully and evenly colored.

The student will create a well-executed comic strip, a storybook panel, or a succession of drawings involving one or more characters. This will be done in black and white only.

4. Lettering

a. Calligraphy

(1) Various pen and brush strokes
- (a) Straight vertical
- (b) Straight horizontal
- (c) Straight diagonal
- (d) Curving and circular
- (e) Angular
- (f) Rippling

Using nibs-type pen with various points, the student will practice these strokes in India ink until he/she feels in control of them.

The student will also practice these strokes using different-size brushes and an oil-based paint.

(2) Various styles of lettering and the feelings created by them
- (a) Freehand
- (b) Transfer type

The teacher will show examples of lettering and the students will discuss the effectiveness of the lettering style as related to the lettered message.

(3) Spacing of letters and lines of writing

The students will point out weak spots or errors of spacing or leading in the above examples.

(4) Decorative initial letters

(5) Monograms

The student will practice 3 styles of decorative freehand lettering by executing a well-done alphabet for each style. The first style will be Old English, the second style will be chosen by the student from a lettering book or catalog, and the third style will be created by the student.

The student will letter a slogan or saying, using one of these decorative styles. It will be done on top-grade paper using pen and one or more inks; it will be attractively arranged on the page, which may have a decorative border; and the initial letter should be decorated in some fashion.

| | |
|---|---|
| | The student will design and create a monogram from his/her initials. |
| b. Pictorial lettering | |
| (1) Creating letters from images | The student will letter two signs of only one to three words each by creating the letters from appropriate images. For example:<br>1. The word HOT may be created from flames, or the letters may be drawn "on fire."<br>2. The letters in the word SMOKE may be drawn as if they are wisps of smoke.<br>The student should be cautioned to keep the word(s) legible. |
| (2) Creating images around letters | The student will create a sign, logo, or calling card about himself/herself. It should include name, address, telephone number, and occupation. Images, colors, and type styles should reflect the personality of the student. |
| 5. Specific drawing problems | |
| a. The human head | |
| (1) Elements of the head<br>(a) eyes<br>(b) noses<br>(c) mouths, tongue and teeth<br>(d) facial muscles<br>(e) ears<br>(f) hair | The teacher will demonstrate simple methods of drawing the individual elements of the head. The student will practice drawing them, then alter them in various ways (e.g., a smiling mouth, a frowning mouth, an open mouth, a mouth with fat lips, a mouth with thin lips). The student should closely observe classmates and other people for different facial features. He/she should try different styles of drawing the elements. |
| (2) Structure of the head<br>(a) Basic proportions<br>(b) Modified proportions – from realistic to caricature | The teacher will demonstrate how to proportion and draw a basic head from different views and how to alter them. The student will sketch many heads, first trying some with the basic proportions and placement of features, then drawing modified versions. The student will try altering the heads just a little, so they look like different people, then try exaggerating the alterations until the heads look like caricatures or cartoons. |
| (3) Views of the head<br>(a) Front<br>(b) Quarter-angle<br>(c) Side-view<br>(d) Back | |

| | |
|---|---|
| (4) Facial expressions<br>(a) Normal<br>(b) Contorted and exaggerated | The student will study his/her face in a mirror and observe the facial muscles and features when different emotions are expressed. He/she will fill a page with sketches of faces showing various emotions. In order to see if these emotions are being clearly communicated, this page will be given to a fellow student for labeling the faces with corresponding emotions. |
| (5) Facial variations by--<br>(a) Age<br>(b) Sex<br>(c) Race | Using a mirror, the student will draw a self-portrait that captures his/her likeness. With the aid of a light table or viewer, the student will redraw the self-portrait 4 times with the following alterations:<br>1. Change the facial expression.<br>2. Change to a caricature.<br>3. Change the age to very old or very young.<br>4. Change the race.<br>Each portrait will be done in a different medium and style. |
| | The student will make a surrealistic portrait of one or more people, using magazine collage. Faces from magazines will be cut up, rearranged, and distorted. Pictures of other objects can also be used to create faces. |
| b. The human figure | The student will cover two pages with well-proportioned stick figures in different positions. The first page will have possible positions that the human body can assume, and the second page will have exaggerated positions. The student will sketch a progression of stick figures as a figure carries out an activity such as dancing, ice skating, chopping wood, etc. |
| (1) Proportions and gestures<br>(a) Using the stick figure | |
| (b) Using spirals to indicate volume | Having classmates pose as models, the student will make *very quick* gesture sketches by first drawing the central axis of head and spine, and the shoulder, hip, and limb positions with straight lines, then by surrounding these lines with spiraling lines that indicate the proportional volume of each part. |

| | |
|---|---|
| (c) Constructing with geometric solids | The student will redraw the above figures using geometric solids for the construction. |
| (d) Refining the figure | Using a light table or viewer, the student will trace over the figure sketches with loose contour lines, refine positive and negative shapes, and roughly indicate some facial features, finger positions, and shadows. |
| (2) Feelings created by gesture and proportion<br>(a) Mood or emotion<br>(b) Real or caricature<br>(c) Age<br>(d) Sex | Again using models and some props (e.g., canes, umbrellas, costumes, hats), the student will create many refined gesture drawings in different styles that aim at communicating a particular image or feeling. The student will choose two of these to transform into highly rendered drawings that indicate shadows and highlights, texture, facial expression, etc. |
| (3) Clothing | |
| (4) Hands<br>(a) Structure<br>(b) Gestures | The student will make six well-proportioned sketches of hands in different positions, and four sketches of feet. |
| (5) Feet<br>(a) Structure<br>(b) Gestures | The student will compose a drawing of 2 – 3 figures, each in a different position and interacting in some way (e.g., mother and child). This drawing may be in any style. |
| | The student will create a drawing of a crowd of people in any style preferred. |
| c. Animals | The student will sketch various animals in action positions. If possible, the teacher will obtain stuffed animals from a taxidermist for observation drawings. |
| (1) Mammals<br>(a) Features such as fur, hoofs, feathers, ears, etc.<br>(b) Structures<br>(c) Gestures | The student will choose a creature from each category and make a personified cartoon character from it. |
| (2) Reptiles<br>(a) Features<br>(b) Structures<br>(c) Gestures | The student will develop a fantasy creature by combining parts of mammals, reptiles, fish, and insects. The creature should appear functional in that it has a way to eat, a way to travel, a way to see, etc. |
| (3) Fish<br>(a) Features<br>(b) Structures<br>(c) Gestures | |

(4) Insects
  (a) Features
  (b) Structures
  (c) Gestures

d. Plants

(1) Elements
  (a) Types of leaves
  (b) Types of stems
  (c) Types of flowers
  (d) Types of roots
  (e) Types of seeds

The student will make observation sketches of various plant elements and structures.

The student will create two rendered drawings of different plants that are accurate enough to be placed in a botanical journal.

(2) Structure of plants

(3) Trees

The student will use spiraling lines to sketch various tree trunks and branches.

(4) Feelings or emotions that can be illustrated through plants.

He/she will create three illustrations of trees, each conveying a different feeling.

The student will attempt to personify a tree by giving it a human gesture.

e. Architecture

(1) Elements
  (a) Curving forms
  (b) Angular forms

Using pictures for reference, the student will sketch several different types of buildings for their general form, materials, and decorative additions.

(2) Materials and construction

(3) Proportion

(4) Styles

The student will develop a street scene that shows a particular style or styles of architecture. He/she may use reference materials.

f. Landscapes

(1) Viewpoint
  (a) Microcosmic

Using a terrarium, a piece of moss, or pictures, the student will draw a microcosmic landscape by observing the minute fungi and plants. He/she may add minute creatures to the landscape.

  (b) Macrocosmic

The student will sketch a realistic landscape, incorporating all the elements listed under (2).

(2) Elements
  (a) Water
  (b) Air
  (c) Earth – soil, sand, rock
  (d) Vegetation and other life forms

The student will sketch a fantasy landscape incorporating the same elements.

| | |
|---|---|
| (3) Seasons | The student will sketch a landscape four times, showing the different seasons and using different media. |
| (4) Moods or feelings | The student will create a landscape out of collage materials from magazines. These may consist of pictures that are cropped or paper cut and torn to form tree shapes, mountain shapes, etc. The foreground will show greater detail than the background. |
| g. Objects | The student will sketch objects and groups of objects, using various media and styles, as indicated by the teacher. |
| (1) Mechanical objects<br>(a) screws<br>(b) bolts<br>(c) gears | The student will create a mechanical man or animal made from machine parts. It need not appear feasible from an engineering viewpoint, but the parts should lock or be screwed together to create joints. The mechanical man may have human proportions, or it may be very different – like a box on wheels with tubular appendages ending in clamps. |
| (2) Transparent objects | |
| (3) Tools | |
| (4) Cooking utensils | |
| (5) Foods | The student will create a graphic design symbolizing the different food categories. |
| (6) Vehicles<br>(a) cars<br>(b) airplanes<br>(c) trains<br>(d) buses | The student will practice sketching realistic and cartoon images of transportation vehicles. He/she will create a personified vehicle. |

**Supplies Needed**

In addition to all supplies previously mentioned, this unit requires air brushes and associated materials.

Gerhard Gollwitzer's book, *Express Yourself in Drawing*, published by Sterling Publishing Company, Inc., New York (1973), is particularly recommended.

## Unit VI – Visual Display

**Specific Objectives**

The student will demonstrate competence in the field of visual display by performing the following:

1. Mount and mat pictures, and design and produce posters, signs, wall displays, and other two-dimensional display projects.
2. Design and produce three-dimensional displays and construct three-dimensional objects for display purposes.
3. Design and produce stencil artwork and silk-screen printing (optional).
4. Help make a visual-display project based on the artwork produced in this component.

**Basic Content**

1. Constructing a cube
2. Mounting and matting pictures
3. Designing wall displays
4. Designing three-dimensional displays
5. Signs, posters, and window cards
6. Stenciling (without a screen) (optional)
7. Silk-screen printing (optional)
8. Commercial art visual-display project

**Suggested Learning Activities**

| Theory | Activity |
|---|---|
| 1. Constructing a cube | |
| a. Materials<br>(1) Chipboard<br>(2) Mat knife<br>(3) T-square, triangle, ruler<br>(4) Tape or glue | The student will construct a neat and sturdy one-foot cube from chipboard that can be used for a display stand or object on which to mount pictures and signs, by following steps (b) and (c). |
| b. The pattern<br>(1) Design and sketch a pattern on paper.<br>(2) Position tabs on the pattern for holding the cube together.<br>(3) Test the paper pattern by folding, and correct if necessary. | On sturdy paper, the student will design and sketch small patterns for other geometric solids such as:<br>a. rectangular solid<br>a pyramid<br>a prism<br>The student will test these patterns by cutting them out of the paper and folding them into the shapes. He/she should save patterns of basic geometric solids for reference if needed later. |

c. The cube

(1) Transfer the pattern in final size to the chipboard.

(2) Cut the chipboard.

(3) Score and bend the chipboard.

(4) Fasten the sides of the cube by gluing, taping, or inserting tabs into slots.

2. Mounting and matting pictures

a. Select the method and materials based on:
(1) Desired effect
(2) Desired quality
(3) Cost limitations
(4) Time limitations

The teacher will show examples of pictures that are mounted and matted in various ways.

The class will discuss the advantages and disadvantages of mounting or matting in terms of visual effect, quality, cost, and time.

The student will demonstrate effective skills and judgment in displaying pictures by mounting and matting various pictures for his/her portfolio and wall displays.

b. Mounting pictures
(1) Cropping the picture
(2) Planning the mount
(a) Color selection

(b) Width and proportion of border

(c) Texture or material of border(s)

(d) Application of pinstripe or other decorative border, using graphic aids, paint, or ink

(3) Positioning and adhering the picture

c. Matting pictures

(1) Color and material selection
(2) Size and shape of window(s)
(3) Width and proportion of frame

(4) Use of pinstriping or other decorative border by:
(a) applying tape or graphic aids
(b) drawing or painting
(c) cutting and stripping away the top layer of the matboard.

(5) Cutting the mat
(a) Measure and draw guidelines.
(b) Set up cutting guide.
(c) Cut straight or beveled edges.

(6) Positioning and adhering the picture and mats

d. Protecting the picture if necessary with a paper, plastic, or cellophane layer – by flapping or other means.

3. Designing wall displays

a. Definition and analysis of the message

(1) Content
(2) Function
(3) Nature of audience

b. Location for the display

(1) Well-lighted area
(2) Maximum exposure to the desired audience

(3) No viewing obstacles – can be seen from a distance as well as close up

(4) Safe from elements which may damage display

c. Collection and/or creation of the elements for the display

(1) Pictures
(2) Signs and printed information
(a) Hand lettering
(b) Transfer type
(c) Strike-on type
(d) Cut-out letters
(e) Other available methods

(3) Other materials that will aid in realizing the display's purpose.
(a) Different types of paper
(b) Different colors of paper

Given a wall-display project for exhibiting student work or other display projects, the student will:

a. Define and analyze the message of the display.

b. Choose a suitable location for the display.

c. Lay out the display.

d. Construct the display.

(c) Mat and mount board for pictures
(d) String, yarn, etc.
(e) Colored tacks or push-pins

d. Layout of the display – sketch showing the arrangement of the elements

Given a hypothetical display project, the student will make sketches of various layout possibilities, considering
Balance
Unity
Eye movement
Emphasis of important areas
Color
Background considerations – color, material, and design

e. Construction of the display

(1) Decision on type of adhesive or fasteners to use

The student will label the layouts in terms of color, pictures, letter types, etc., and choose the one which conveys the desired message or purpose most effectively.

(2) Techniques of using various adhesives and fasteners

The student will repeat the above for 2 or 3 other projects.

f. Evaluation of display and correction if necessary

The teacher and student together will evaluate the constructed display.

(1) In terms of two-dimensional design

(2) In terms of its purpose

4. Designing three-dimensional displays

a. Definition and analysis of the message

The student will observe various three-dimensional displays in stores or elsewhere and sketch 5 that he/she considers to be very effective. The sketch will have notations indicating color combinations, materials used, construction methods, lighting techniques, etc.

b. Collection of readily usable elements for the display

(1) Two-dimensional elements to be displayed

(2) Three-dimensional elements to be displayed

(3) Objects for the underlying structure
(a) Self-standing display boards
(b) Cardboard boxes
(c) Wooden crates
(d) Stools and ladders
(e) Manikins

(4) Coverings and camouflages for the underlying structure, walls, and/or floor

(a) Cloth
(b) Paper
(c) Mats or screens
(d) Woodchips, straw, or other natural elements

c. Creation of two-dimensional elements for the display

(1) Pictures
(2) Signs and written information
(3) Background design

d. Creation of three-dimensional elements

(1) Pariscraft objects molded over parts of the body, wire balloons, etc.

(a) On which to display other elements (e.g., a hand and arm for displaying bracelets)

(b) For attention and instructional purposes (e.g., a hand pointing; a hand showing how to hold a tool)

(2) Papier mache objects molded over chickenwire, balloons, crushed paper, etc.

(a) On which to display other elements (e.g., doll-like manikins for displaying clothing)

(b) For attention and instructional purposes (e.g. a simple replica of a dinosaur)

(3) Cardboard, box, or found-object construction

Working in groups, the students will create one Pariscraft object molded over hands or balloons, one papier mache object molded over chickenwire or balloons, and one construction based on cardboard, boxes or found objects. If possible, these objects should be created for specific display projects.

(a) On which to display other elements (e.g., painted wood crates arranged and nailed together; clothing, manikins cut out from thick cardboard)

(b) For attention and instructional purposes (e.g. a small replica of a space capsule made from cardboard shapes)

e. Location for the display

(1) Consideration of size and number of elements

(2) Use of showcases or windows

(3) Desired viewing angles

(4) Access to the desired audience

(5) Safety measures
(a) For the display
(b) For the viewers

(6) Lighting possibilities

f. Arrangement of the elements

(1) Adaptation of design principles to three-dimensional design

(2) Creation of a sturdy understructure

(3) Development of viewing angles

(a) From all or many angles
(b) Limiting the viewing angles (e.g. peepholes made in opaque paper that covers showcase window)

g. Lighting

(1) Indirect or reflected
(2) Direct or spotlighting
(3) Incandescent vs. fluorescent
(4) Colored lights
(5) Colored light-wheels that spin

The class will review the color combinations obtained by combining various colors of light.

The class will discuss various lighting techniques and how to achieve them; also safety precautions that must be taken concerning the lighting of displays.

(6) Strings of lights
(7) Boxes for camouflaging light source
(8) Light stands, clamps, shields, etc.
(9) Effects of moods created by different lighting
(10) Safety measures

Given an actual display project, the student or students will create the display.

5. Signs, posters, and window cards

a. Design and construction criteria

(1) Purpose
(2) Nature of audience
(3) Viewing distance and circumstances of audience ("captive," on-the-run, etc.)
(4) Location
(5) Cost and time limitations

The class will discuss how each of the points mentioned under (a) affects the design of the poster or sign.

Each student will select 8 to 10 signs or posters from the surrounding area and sketch each roughly, using color. The student will critique each in writing in terms of all the points listed opposite and give an overall appraisal of each.

b. Planning the sign

(1) Size
(2) Materials
(3) Type of construction (free-standing, attached)

c. Getting the message across

(1) Wording – selecting message in terms of quick comprehension and desired emphasis
(2) Illustrations
(a) To attract attention
(b) To clarify message

d. Steps in production of signs, posters, and window cards

(1) Assemble materials.
(2) Sketch layout according to above considerations and design principles.
(3) Determine specifics of color and style of lettering.

Given an actual or hypothetical project for one permanent-type sign (e.g. a wood shingle for a professional person or store) the student will:

a. Create a small sketch showing the layout and specifications such as lettering style, color, etc.
b. Discuss with the teacher his/her reasons for making the decisions shown on the sketch.
c. Produce a well-executed sign.

(4) Scale layout to actual size.

(5) Complete project by one or more of the following processes:

(a) Drawing and lettering with markers, crayons, chalk, etc.

(b) Painting and lettering (freehand or using mechanical guides)

(c) Pasting artwork

(d) Stenciling

(e) Screenprinting

The student will perform the same three steps in creating

1. A "Daily Special" poster for a diner.
2. Several posters for instructional purposes.

6. Stenciling (without a screen) (optional)

a. Tools and materials

(1) Drawing equipment

(2) X-acto knife

(3) Stencil paper or bristol board

(4) Oil or water-based paints (depending on type of stencil)

(a) In spray can

(b) In jars or tubes)

(5) Stiff brushes for dabbing and spattering

b. Procedure

(1) Produce design on drawing paper.

(a) Simple and of suitable size

(b) Center areas connected with thin strips

(c) Different color areas indicated

The teacher will demonstrate the stencil process and show examples of stencil work. The class will discuss the various uses of the stencil in production work.

Using samples of stenciled letters, the teacher will point out how center areas must be connected.

(2) Transfer design to stencil paper or bristol board

(3) Cut out design.

(a) Cut out areas that are to be printed.

(b) Cut straight lines first, then curved lines.

(c) Remove cut-out portions.

(d) If necessary, make separate stencils for different colors

(4) Print the design

(a) Draw register marks on paper or ground that will be printed on.

(b) Position stencil on printing ground according to register marks.

(c) Tape corners of stencil to hold it fast.

(d) Protect surrounding areas of printing ground with a mask.

(e) Spray, dab, or spatter paint over cut-out areas.

(f) Use mask to cover dried printed areas while working on other areas.

(5) Carefully remove stencil.

(6) Repeat with stencil in different position, with different color, or with different stencil.

c. Characteristics of the stencil process

(1) Allows much flexibility in paint application

(2) Many colors can be used with just one stencil.

(3) Accuracy and precision are difficult to obtain – design should be simple and bold or used for background.

(4) A reverse stenciling technique may be used for variation where the cut-out design is laid on paper and paint is sprayed *around* it, leaving the design as a negative shape on the paper.

The student will create a simple stencil using a design or lettering. He/she will use this stencil to demonstrate three different ways that paint can be applied in using stencils, and three different ways to achieve a multiple-color design using a single stencil (for example, by shifting the stencil after one color has been applied).

The student will also use the cut-out portions of the stencil to create a reverse print.

7. Silk-screen printing (optional)

a. Kinds of screen printing

Using examples, the teacher will describe each of the different kinds of screen printing. The class will discuss which methods would be best for specific types of artwork and specific production goals.

(1) Paper-stencil method
(2) Glue block-out method
(3) Tusche-and-glue method
(4) Lacquer-film method
(5) Water-soluble-film method
(6) Photographic stencil method

b. Tools and materials

(1) Basic tools and materials

The teacher will introduce all of the tools and materials for the screen printing methods (1) to (5) listed under 7a.

(a) Silk-screen frames, baseboards, and hinges

The teacher will describe the different types of silk-screen frames and how they can be made. He/she will also point out the various types of fabrics that can be used for silk screens and the effect of each.

(b) Screen fabric

(c) Hammer, tacks, cord, or staple guns for attaching screen fabric to frame

(d) Squeegees

The teacher will describe the various types of squeegees and when they are used.

(e) Paint spatulas
(f) Jars and palette for mixing paints or inks
(g) Drying rack or line
(h) Large table
(i) Various kinds of stencil knives
(j) Metal rulers, T-square, and triangle
(k) Tapes – masking and gum
(l) Rags
(m) Fireproof containers for rags
(n) Kerosene
(o) Papers and boards for printing on
(p) Newspaper supply for covering table

(q) Paints, inks, and related solutions
- –water-base paint
- –oil-base paint
- –lacquer-base paint
- –process-printing ink
- –extender
- –transparent base
- –thinners

(2) Special materials for paper-stencil method
- (a) Stencil paper
- (b) Glue

(3) Special materials for glue block-out method
- (a) Glue mixture for painting on screen
- (b) Brushes

(4) Special materials for tusche-and-glue method
- (a) Liquid or stick tusche (lithographer's crayon)
- (b) Cornstarch
- (c) Glue
- (d) Brushes

(5) Special materials for lacquer-film method
- (a) Lacquer film
- (b) Lacquer thinner or cleaner
- (c) Adhering liquid
- (d) Glue or block-out solution

(6) Special materials for water-soluble-film method
- (a) Water-soluble film
- (b) Adhering liquid

c. Securing the screen fabric to the frame

If possible, the student should stretch and secure the screen fabric to the frame.

(1) Stretch and secure the fabric with tacks, staples, or a cord wedged into grooves.

(2) Line inside of frame and border the screen with gum tape.

d. Preparing equipment

(1) Hinge frame to baseboard.
(2) Establish register guides.

After hinging the frame to the baseboard, the student will demonstrate how to properly establish register guides.

e. Basic procedure for paper-stencil method.

(1) Create design and indicate different color areas.

Based on actual or hypothetical situations, the student will create 2 small signs or designs using a different silk-screen method for each; or the student will create one poster design and use a combination of two silkscreen methods to print it. Each print will have two or more colors, but these need not be produced from different stencils (See j., Printing and Inking techniques).

For each project, the student will complete at least 10 prints, of which three must be different in some way (color, overlapping, repetition, colored background, etc.) The class will critique the prints in terms of technique, design, and the criteria listed in Unit I.

(2) Cut out stencil. Cut a different one for each color so they aline properly. Do not remove pieces.

(3) Position one stencil under screen, using register marks.

(4) Lower screen and apply spots of glue through the screen onto areas of the stencil that will remain. Let dry.

(5) Mask edges around design if it is not as large as screen.

(6) Squeegee heavy paint or ink across screen.

(7) Lift screen and remove cut-out portions that are to print.

(8) Lay paper under screen and print.

(9) Clean screen, using necessary solutions for dissolving paint, ink, and glue.

(10) Repeat steps (3) to (9) for each color.

f. Basic procedure for glue block-out method

(1) Create design and indicate color areas.

(2) Position design under screen according to register marks.
(3) Trace design onto screen with pencil.
(4) Prepare glue block-out solution.
(5) Paint solution on screen to block out all areas that should not print. Let dry.
(6) Mask any exposed edges.
(7) Using strong light, check for pinholes and touch them up.
(8) Print with oil or lacquer-based paints or inks.
(9) Clean screen.
(10) Repeat steps (2) to (9) for each color.

g. Basic procedure for tusche and glue method

(1) Create design and indicate different color areas.

(2) Position design under screen according to register marks and trace onto screen with pencil.

(3) Remove frame with screen from base and place frame on blocks.

(4) Apply even coating of cornstarch and water solution (1 T. cornstarch to 1 cup water) to underside of screen. Let dry.

(5) On other side, paint everything that *will* print with liquid tusche, or use the crayon for a rough or textured effect. Let dry.

(6) Coat entire surface with glue, spread on with a piece of cardboard. Let dry.

(7) Check glued area for pinholes; touch them up.

(8) Rub both sides with kerosene-soaked rags until all tusche has been removed.

(9) Dry screen with clean rags to remove kerosene.

(10) Hinge screen to base and print

(11) Clean screen.

(12) Repeat steps (2) to (11) for each color.

h. Basic procedure for lacquer-film method

(1) Create design and indicate different color areas.

(2) Tape down design with lacquer film covering it (lacquer surface up)

(3) By tracing, cut out the design. (Use only enough pressure to cut through lacquer film without marking the backing sheet) Cut one stencil for each color, so they aline properly.

(4) Peel cut-out portions away from backing.

(5) Cut a small slit in the backing sheet in any large open areas (to allow air to escape during adhering)

(6) Position lacquer stencil under screen, using register marks to position.

(7) Adhere stencil with the manufacturer's recommended adhering liquid. Let dry.

(8) Carefully remove backing sheet.

(9) With adhering fluid, correct areas that have not adhered well; correct with glue any areas that were burnt out.

(10) Mask exposed edges around stencil.

(11) Print.

12) Clean screen with lacquer solvent.

(13) Repeat steps (4) to (12) for each color.

i. Basic procedure for water-soluble film method – same as for lacquer-film method, except

(1) Water-based paints and inks should not be used.
(2) Stencil is removed with water after ink is removed with kerosene.

j. Printing and inking techniques

(1) With opaque colors, print light colors first, then dark colors.

(2) With transparent colors (made by using transparent base), print dark colors first, then light colors.

(3) Consider printing on colored paper.

(4) Two or more colors may be laid on the screen at once, so they streak and blend as the squeegee is passed over them.

(5) Toning or shading may be accomplished by dry-brushing the block-out solution over areas of a printed stencil, leaving those areas clear that are to be printed again with a darker color.

(6) Screen-printing methods may be combined for greater flexibility. (E.g., a simple design may be printed very quickly with the glue block-out method; then lettering may be printed over this, using the lacquer-film method.)

(7) Colors may be quickly applied to the paper before printing with a brush, roller, sponge, spray can, etc. for background or borders.

8. Commercial art visual - display project

a. Function of project

(1) To serve as an introduction to the field of commercial art for incoming students.

(2) To serve as a course review.

(3) To serve as a guide for critiquing the course

(4) To critique individual student work and identify student's strong and weak areas.

b. Content – a slide presentation of the best artwork produced during the year.

Each student, with the help of the teacher, should select the best material in his/her portfolio, preferably various types of artwork. The class can assemble the materials by topic and produce the slides. If desired, an accompanying audio presentation can be produced.

c. Nature of audience

(1) Students who are completing the art component

(2) Students who are being introduced to the art component.

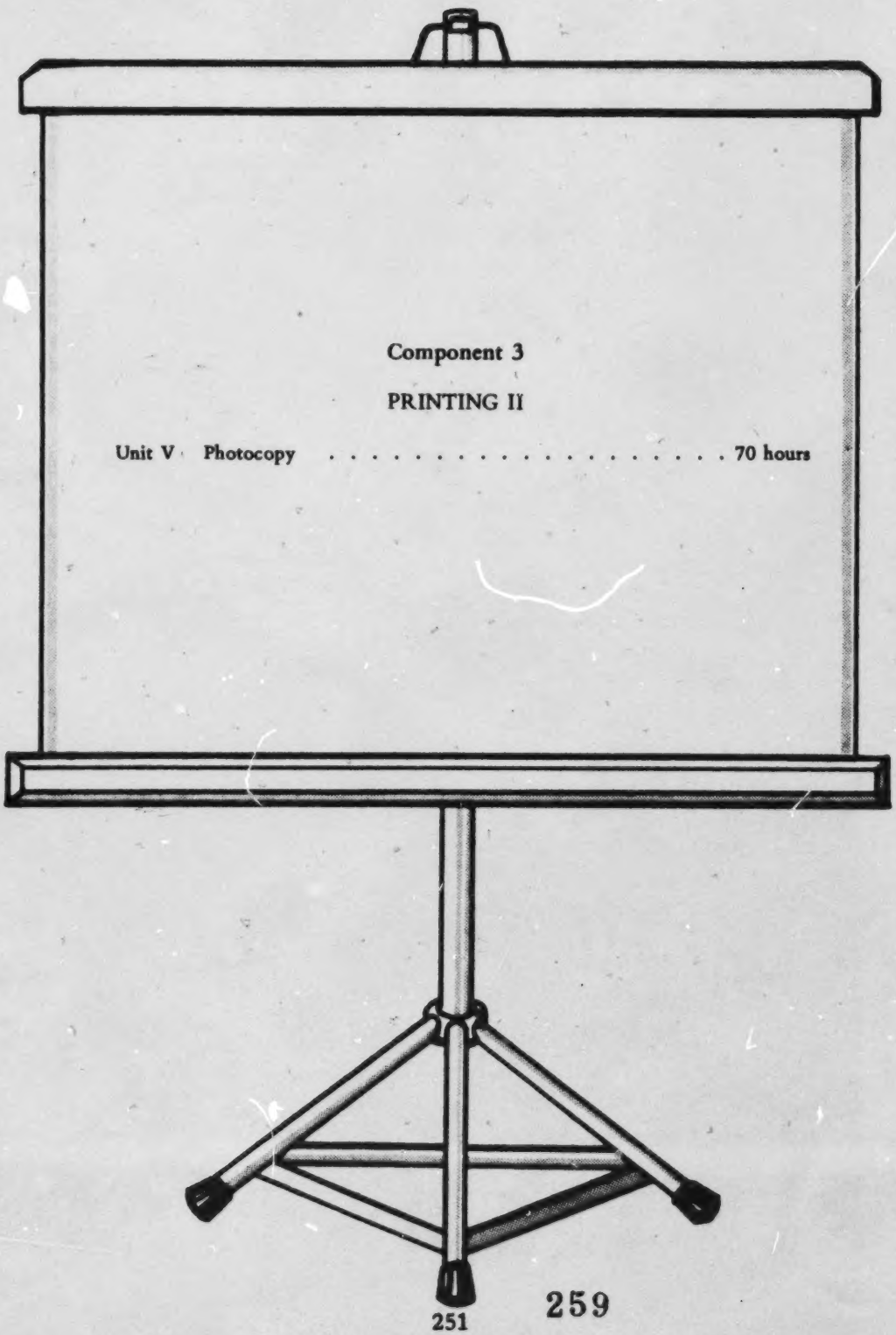
**Supplies Needed**

In addition to the supplies required for previous components, the following will be needed:

Paper or plastic for protecting artwork
String, yarn, tacks, pushpins for wall displays
Boxes, crates, stools, etc. for three-dimensional displays
Cloth, paper, mats, and various natural materials for covering the base objects in three-dimensional displays

Pariscraft and objects to be molded
Papier mache chicken wire, balloons, etc.
Spotlights and hardware, strings of light, colored films for spotlights
Wood for signs
Enamel paints
Materials for silk-screen printing
Access to cameras and materials needed to develop slide presentation.

Second Year



Component 3

PRINTING II

Unit V Photocopy . . . . . 70 hours

## Component 3 – Printing II

### Unit V – Photocopy

(70 hours)

**Specific Objectives**

The student will demonstrate competence within the area of photocopy as follows:

1. Operate the graphics camera and produce satisfactory line and halftone negatives and positives.
2. Strip, burn, and develop plates.
3. Produce masters on a camera processor

**Basic Content**

1. Principles of photography
2. The graphics camera
3. Reproducing line artwork
4. Reproducing halftones
5. Stripping and platemaking
6. Camera processor

**Suggested Learning Activities**

| Theory | Activities |
|---|---|
| 1. Principles of photography | |
| a. Light reflection<br>b. Action of lens<br>c. Chemical changes | Through discussion and demonstration, the student will be made aware of the changes that occur when exposing and developing film.<br>The student will observe these changes as he/she develops film. |
| 2. The graphics camera | |
| a. Camera components<br>b. Lens settings<br>c. Enlargement and reduction settings<br>d. Determining exposure length<br>e. Identifying base and emulsion sides of film | Given copy to reproduce, the student will calculate the needed enlargement or reduction of copy.<br>The student will set camera according to the determination of enlargement or reduction of copy.<br>The student will determine length of exposure. |

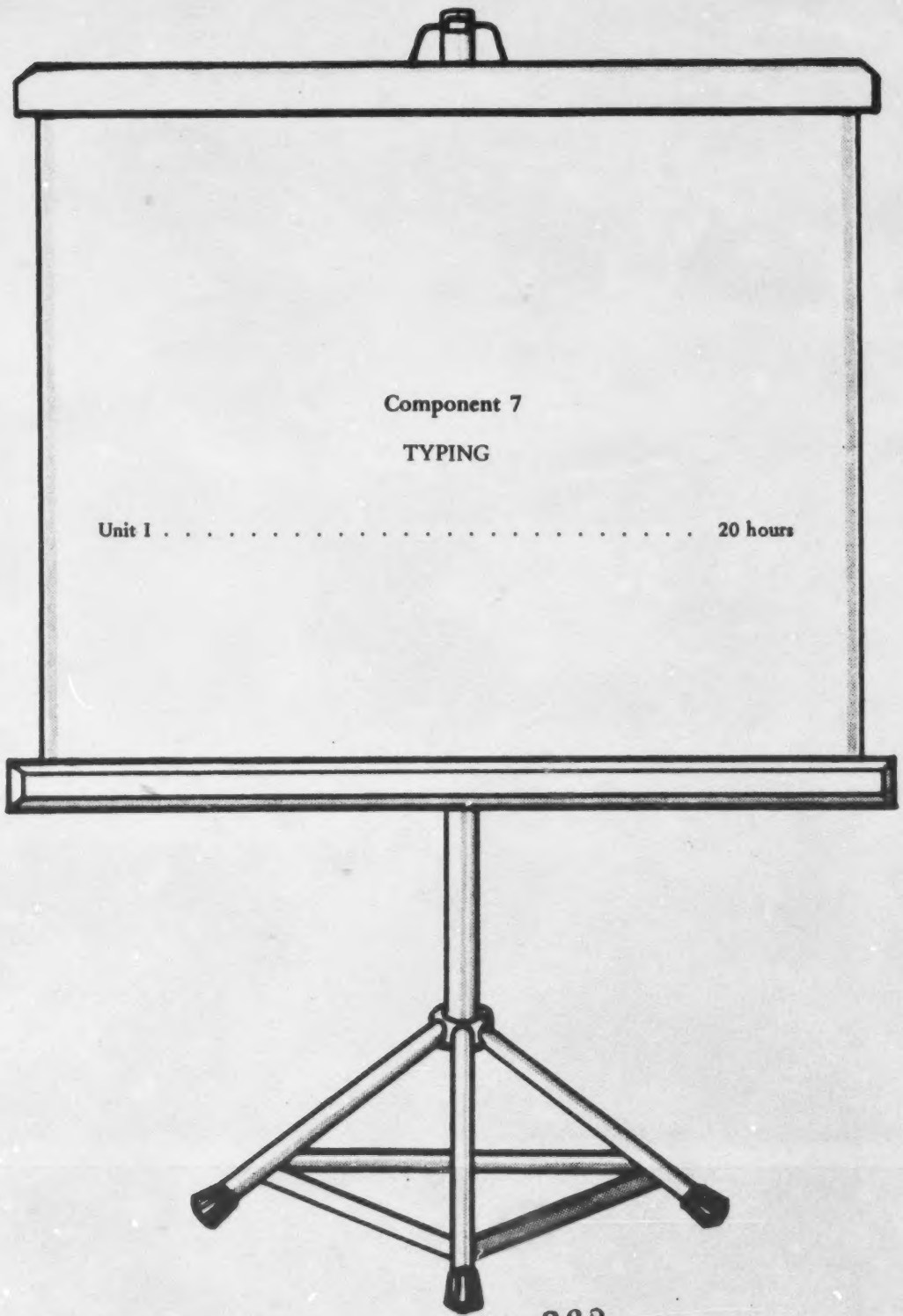
| | |
|---|---|
| f. Tray layout | In the dark room, the student will set up tray solutions. |
| g. Preparation of tray solution | |
| h. Developing procedures | The student will then expose film, identifying base and emulsion side of film. |
| i. Opaquing | The student will develop film according to accepted procedures. |
| j. Film positives | |
| k. Contact printing techniques | The student will make a contact print of the negative. |
| 3. Reproducing line artwork | The student will be made aware of the quality of line artwork that can be reproduced satisfactorily. |
| | The student will be shown poor, passable, and quality line work that can be reproduced and will evaluate each. |
| 4. Reproducing halftones | |
| a. Quality variations in original photograph | The student will demonstrate knowledge of the quality of halftones that can be reproduced satisfactorily by evaluating numerous samples of halftones of varying qualities. |
| b. Contact screen | |
| c. Calibration computation – use of prepared table | Given an original photograph, the student will determine the main exposure and flash exposure. |
| d. Main exposure with contact screen | |
| e. Flash exposure with contact screen | The student, using contact screen, will then expose film and develop. |
| | The student will make contact print of negative. |
| | The student will be introduced to various sizes and types of contact screens. Using a single photograph, he/she will obtain different effects by the use of different screens. |
| | The student will practice reproducing various qualities of halftones in contact size and enlarged and reduced sizes. |
| 5. Stripping and platemaking | |
| a. Stripping the negative | Given a negative, the student will strip it in on piece of goldenrod. |

| | |
|---|---|
| b. Opaquing | The student will position negative on flat in proper position. |
| c. Selecting the proper type of plate | The student will select proper type of Plate (i.e., additive, subtractive, wipeon, etc.). |
| d. Positioning plate and negative | |
| e. Timing exposure of plate | The student will determine correct exposure of plate and expose it. |
| f. Developing the plate | |
| (1) Chemicals needed<br>(a) For additive plates<br>(b) For subtractive plates | The student will develop plate according to instructions. |
| (2) The mechanics of plate development | The student will practice stripping and platemaking with various sizes of negatives. |
| | Given examples of poor-quality plates, the student should be able to suggest remedies. |
| 6. Camera processor | |
| a. Types and brands available | The teacher should have literature on hand describing various types and brands of platemakers that work by fast, photographic processes. Assuming that one of these is available, the student should learn its operation, including maintenance and minor adjustments necessary. |
| b. Chemicals used | |
| c. Masters used | |
| d. Positioning the copy | |
| e. Reductions and enlargements | Given examples of poor-quality masters, the student should be able to suggest remedies. |
| f. Timing | |
| g. Maintenance | |
| h. Minor trouble-shooting | |

**Facilities and Supplies**

Graphics arts camera, 20x24
Darkroom sink and tray
Light table 25x32
Plate burner
Sink for plate development
Camera processor
Supplies
- Photographic paper up to 14" x 22"
- Darkroom chemicals
- Various colors of ink
- Plates and masters

Second Year



**Component 7**

TYPING

**Unit I** . . . . . **20 hours**

## Component 7 – Typing

(20 hours)

**Specific Objectives**

The student will demonstrate such typing skills as are needed to support a media technician, as follows:

1. Type required material, appropriately spaced on page or card.
2. Center titles horizontally and type tabulated materials.
3. Select type fonts appropriate to the material.
4. Type a minimum of 10 words per minute with 100% accuracy.

**Basic Content**

1. The typewriter – manual, electric, and Selectric
2. Skill development
   a. Placement on page or card
   b. Typing centered materials
   c. Typing ordinary materials
   d. Typing on cards
   e. Tabulations
3. Selection of appropriate fonts

**Suggested Learning Activities**

| Instruction | Student Practice |
|---|---|
| 1. Parts of typewriter, manual and electric<br>a. Keyboard<br>b. Parts and their functions<br>Margin set and release<br>Tab set and release<br>Back space<br>Space bar and repeating-key operation<br>c. Typewriter maintenance<br>d. Ribbon types | The student will practice using the various operating parts of the typewriter. |
| 2. Placement of material on page or card.<br>a. Centering horizontally | The student will learn to locate the horizontal center of a line, and type centered titles. |
| b. Centering vertically | The student will learn how to make material appear to be centered vertically. |
| c. Margins | |

The student will learn how to choose margins appropriate to the amount of typing matter.

The student will practice the above skills on full-size typing paper, halfsize paper, 3x5 cards, and 4x6 cards, using appropriate materials such as

Title slides for filmstrips
Captions for illustrations
Descriptive bibliography cards for software
Video masters for overhead projection
Handout sheets describing new equipment or software

3. Tabulation procedures

The student will practice typing tabulated material with several columns, using approriate numerical reports from the Instructional Materials center.

4. Introduction of varied fonts, such as
   Light italic
   Symbol 10
   Script
   Delegate 10
   Adjutant 12
   Currier 12 italic
   Letter gothic
   Orator

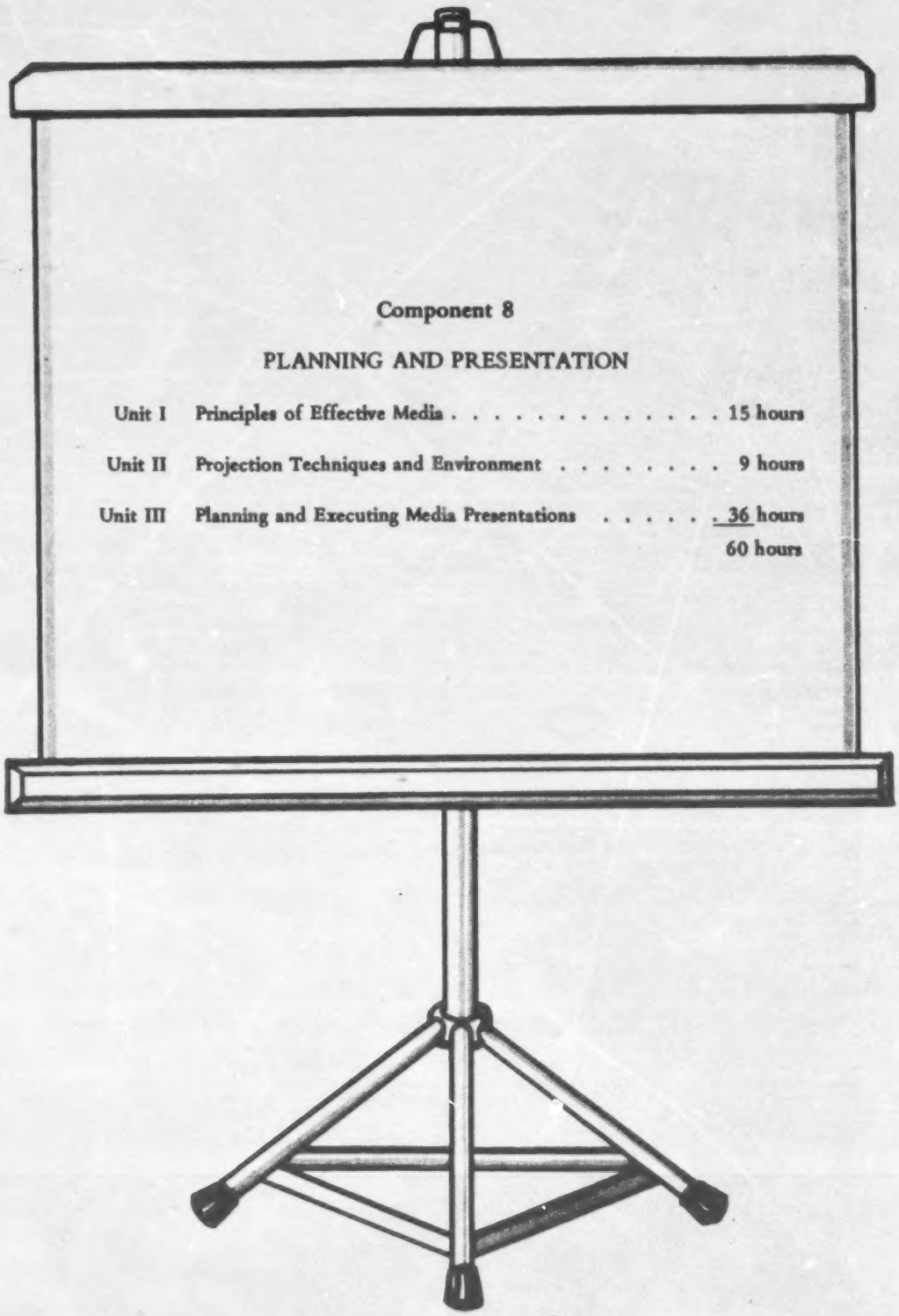
   a. Samples of typing with each font, described and shown.

   b. Discussion of suitable uses for each.

   c. Pitch number of each font.

Some of the above exercises can be repeated, using appropriate fonts. The students should work to increase their speed, while maintaining 100% accuracy.

Second Year



Component 8

PLANNING AND PRESENTATION

| | | |
|---|---|---|
| Unit I | Principles of Effective Media | 15 hours |
| Unit II | Projection Techniques and Environment | 9 hours |
| Unit III | Planning and Executing Media Presentations | 36 hours |
| | | 60 hours |

## Component 8 – Planning and Presentation

### Unit I – Principles of Effective Media

(15 hours)

**Specific Objectives**

The student will demonstrate an appreciation of the most important principles of effective media presentation by evaluating examples of good and poor media.

Later the student will be expected to apply these principles to his own media productions.

**Basic Content**

1. Principles of effective media
2. Advantages of audiovisual devices as a teaching medium

Note: It is suggested that this unit be taught as a lecture-demonstration-discussion unit. Each principle can be demonstrated with (1) an ineffective audiovisual aid (where available) and (2) effective material in the same medium. This should be followed by class discussion of why the latter is effective and the former is less effective.

**Suggested Learning Activities**

1. Some principles of effective media.

   a. **Motivation.** Presentation makes person *want* to learn something. Some ways of providing motivation:
      (1) Appeal to a desire for success in his/her
          vocation
          social life
          personal life
      (2) Make material so attractive and interesting that he/she wants to learn.
      (3) "Start off with a bang" – use some device to arouse interest.
      (4) Arouse curiosity.
      (5) Use humor to set the stage for learning.
      (6) Arouse strong emotions – as love or hate – to stimulate interest.
      (7) Show the relevance of the matter. The subject must seem to be important to a person in some way or other.

   b. **Clarity.** Some principles that make for clarity:
      (1) Build on what the person already knows (not what he/she *should* know).
          Material must be designed with the age, abilities, and limitations of its audience always kept in mind.

(2) Teach one new concept at a time
(3) Eliminate all distractions and unneccessary adornments
(4) Keep language simple and direct.
(5) Make ideas as concrete as possible.
(a) Charts and graphs show facts and relationships better than just numbers.
(b) Line sketches and diagrams usually teach more than photographs.

c. **Logical sequence.** Sequence can be built upon:
(1) Step-by-step progress from easy to difficult.
(2) Chronological steps – as in history.
(3) Sequential steps – the order in which a task is performed.
(4) Accretionary steps – presenting preliminary skills first, followed by skills that depend upon them.
(5) In some other sequence, depending upon the subject.

c. **Repetition**
(1) The more ways an idea can be presented, the better it will be grasped and remembered.
(2) A summary at the end of a presentation is important.
(3) Wherever possible, material taught should be reviewed at a later date.

2. Advantages of audiovisual devices as a teaching medium

a. Supply a *concrete basis* for concepts – they have *more meaning than just words.* "One picture is worth 1000 words."

b. Appeal to *various senses* – sight, hearing, feeling.

c. Have a *high interest* factor.

d. Make learning *easier.*

e. Make learning *more permanent.*

f. Keep attention focused for a *long period of time.*

g. *Enlarge the viewer's range of experiences* – in time or space; into the insides of machines or flowers or anything else.

h. Add *variety* to a learning situation and hence . . .

i. *Enhance the effectiveness of other teaching methods.*

## Unit II – Projection Techniques and Environment

(9 hours)

**Specific Objectives**

The student will demonstrate abilities in planning the projection of material, as follows:

1. Calculate requirements for projector-lens focal length, based on given conditions.
2. Plan optimum conditions for different types of projection equipment in a given room or area.
3. Plan and execute a dissolve show.

**Basic Content**

1. Projection optics
2. Design of the projection environment
3. Dissolve units – slide presentation

**Suggested Learning Activities**

| Classroom | Laboratory |
|---|---|
| 1. Projection optics | |
| a. Projectual vs. image size – the calculation of magnification | The student will calculate requirements for projection-lens focal lengths based on projection distances and screen sizes, for specific presentation situations. |
| b. Projection calculations | |
| c. Using projection charts | The student will demonstrate an ability to utilize published projection charts for the same purposes. |
| d. The projection calculator | The student will demonstrate an ability to use the Kodak projection calculator for the same purposes. |
| 2. Physical conditions required for effective use of | |
| a. Film<br>b. Television<br>c. Overhead projectuals<br>d. Slide presentations | Class discussion of optimum and minimum conditions for each medium, and why improper conditions destroy the effectiveness of the presentation. |
| 3. Design of the projection environment | |
| a. Light control | Each student will be assigned the project of making a complete analysis of one |

b. Seating arrangements and screen positioning

c. Placement of projector

d. Special requirements when one screen is used for more than one type of projection device.

e. Ventilation needs

classroom or other area used for the presentation of projected materials. This analysis will include the preparation of a floor plan and a site evaluation showing windows, doors, common seating arrangements, and existing screen-types and locations. The student will also determine the types of projection equipment that can be readily used in this environment.

Based on this analysis, the student will make a plan to prepare the room or area for projection. The plan will show any suggested changes needed in projection-screen placement, light control, or other aspects. In addition, the plan will show best placement for at least three types of projection equipment that may be used in the area, and will specify the focal lengths of lenses with which this equipment should be fitted. The completed analysis will then be reviewed by the instructor. At the instructor's discretion, interviews can be set up with teachers using the room, for the purpose of gathering their inputs. Should the analysis indicate that changes would significantly improve the projection environment, these suggestions may be forwarded to the institution's media or audio-visual personnel.

4. Dissolve units – slide presentation

a. Features of dissolve controls

b. Planning a dissolve show

c. Controlling dissolve by a synchronized tape.

Using two projectors, two trays filled with number slides, and two dissolve units, the student will demonstrate an ability to set up and start a dissolve presentation so that the projectors operate in the proper sequence. Depending on the specific dissolve unit used, the student will demonstrate his ability to vary the interval (when internally timed) and the dissolve rate, and to automatically select "cuts" or "dissolves" when the unit is controlled by a synchronized tape.

## Unit III – Planning and Executing Media Presentations

(36 hours)

### Specific Objectives

The student will demonstrate attainment of this unit of instruction by effectively planning, developing, and delivering media and multi-media presentations as directed by the content and activities of this unit.

### Basic Content

1. Matching the medium to the message
2. Planning, scripting, and story-boarding presentations for a variety of media
3. Planning and executing a "learning package" with attention to showmanship
4. Utilizing dissolve techniques
5. Applying the criteria for effective media presentations

### Suggested Learning Activities

| Classroom | Laboratory |
|---|---|
| 1. Matching the medium to the message | |
| a. Determining the actual instructional objectives and interest level for a learning experience<br>b. Selection of medium best suited to accomplish the desired results<br>c. Consideration of costs in materials and manpower in relation to the objectives<br>d. Modifications to meet cost requirements or specific student instructional needs<br>e. Availability of commercially packaged media<br>f. Limitations of commercially packaged media | Presented with a variety of specific learning objectives, the student will discuss the advantages and disadvantages of the various types of media for each, and, after considering all factors, including costs, decide upon the optimum medium. (More specific information on comparative costs will be developed in the Management component.) |
| 2. Planning, scripting, and storyboarding for a variety of media | |
| a. Uses of the planning card<br>b. Suggested techniques for planning specific types of media presentations<br>(1) Planning for sound-slides and sound-filmstrips | The student, in conjunction with a subject-matter instructor, will completely plan a lesson utilizing one or more media techniques learned in previous components. This lesson-program will be designed for individual use by one student. |

(2) Planning for motion pictures

(3) Planning for television

(4) Planning and scripting for audio-tutorial learning experiences

(5) Planning live and live/media presentations

c. Planning techniques for I.P.I.M's (Individually prescribed instructional modules)

After consultation with the instructor, the student will then produce all necessary software to complement the lesson. The student will then carefully observe the reactions of students using the program for prime instruction, and discuss his/her observations with the instructor. Based on this analysis, the student will modify the program once, twice, or three times, until the subject-matter instructor and the media-technology instructor are both satisfied that the program produces the expected results.

3. Showmanship

a. The problem of capturing and maintaining the interest of an audience

b. Theatrical techniques

c. Building showmanship into a presentation

(1) Technical considerations
(2) Timing and pacing
(3) Audience involvement
(4) Effective use of music and lighting

(5) Common pitfalls

d. Using showmanship in presentation
(1) Setting the mood and audience preparation

(2) The essence of mood and mood modification

(3) Variations in effectiveness of specific equipment and various presentation environments

(4) Effective closings

(5) Hardware problems. Murphy's law and how to offset its ramifications (logistics and redundancy).

The student will plan a "learning package" utilizing both live talent and at least one medium. The package will be planned with particular attention to showmanship. Suggested topics might be a trade-convention sales presentation or a "sell" instrument for vocational-school recruitment. The student will present the actual program to the class. Evaluation will be made by both the class and the instructor.

4. Utilizing dissolve techniques

The students, working in groups of three or four (as assigned by the instructor), will produce a single-screen dissolve presentation on a topic either chosen by them and approved by the instructor or assigned by the instructor. This presentation will be planned and photographed, audio track prepared, and synchronized by the students. The finished presentation will be viewed and evaluated by the entire class, using the following criteria:

1. The degree to which the presentation meets its originally stated instructional purpose.
2. Technical quality of visuals
3. Technical quality of audio portion
4. Overall artistic considerations

5. Applying the criteria for effective media presentations

   a. Determining the instructional objective

   b. Evaluating the audience
      (1) Size of group
      (2) Age
      (3) Ability
      (4) Background knowledge

   c. Deciding on the optimum medium or media

   d. Planning and executing the production

   e. Testing the production
      (1) Does it meet the objective?
      (2) How could it be changed to meet the objective better?

   f. Modifying the production until the objective is met

The student will be assigned an actual media production job by the instructor. The job will be to develop audiovisual materials in some area of instruction within the school system. In close cooperation with the instructor, the student will:

1. Select the most appropriate and cost-effective methods to accomplish the defined purpose.
2. Produce instructional materials using the medium or media and methods selected.
3. In cooperation with the subject-matter teacher, field-test the program with students.
4. Evaluate the effectiveness of the materials.
5. Make any needed modifications in the materials to improve their effectiveness.
6. Repeat steps 3, 4, and 5 until the program satisfies the requirements of both the media instructor and the subject-matter teacher.

During this assignment the student will keep a complete cost log for each phase. Both the student's and the cooperating subject-matter teacher's time will be logged, as well as materials costs.

6. Wide-screen, multi-image and multi-media techniques (Optional)

   a. Wide-screen presentations
      (1) Preparation of visuals for wide-screen use
      (2) Applications of wide-screen techniques
      (3) True-perspective panoramas

The students, working in teams of three to five (as assigned by the instructor), will produce a multi-image large-screen presentation designed for large-audience viewing and automated operation. With their instructor's guidance, the students will plan the presentation, take all visuals necessary, select music, narrate, and record the audio

b. Multiple-screen presentations
   (1) Why multiple screens?
   (2) Methods of producing a multiple-screen format
   (3) Applications of multiple-screen technique

c. Planning multi-image presentations
   (1) Scripting techniques
   (2) Transitions
   (3) Creating impact
   (4) Audio systems and techniques

portion, select and program an automation system to control the show. After completely assembling and testing the presentation, the students will be responsible for showing it to a live audience.

**Equipment and Supplies – Planning and Presentation**

Planning board, internally fabricated (one 4'x8' per class, one 3'x4' for each 2 students)
Spindler and Sauppe "Quadra-Que" four-channel programer
Electronic Designers MMP-10, three-channel programer
Arion or 3M 9-channel digital programer
Punched-tape programing system (8-channel), SAVL or equal, with automatic tape punch
Dissolve units (one of each per class):
a. Spindler & Sauppe
b. Columbia
c. Electrosonics
d. Kodak

Kodak projection lenses (one set of the following for each three students):
a. Kodak Ektanar 2½" *f* 3.5
b. Kodak Ektanar 3" *f* 3.5
c. Kodak Ektanar 4" *f* 2.8
d. Kodak Ektanar 5" *f* 2.8
e. Kodak Ektanar 7" *f* 3.5
f. Ektanar Zoom 4" to 6" *f* 3.5

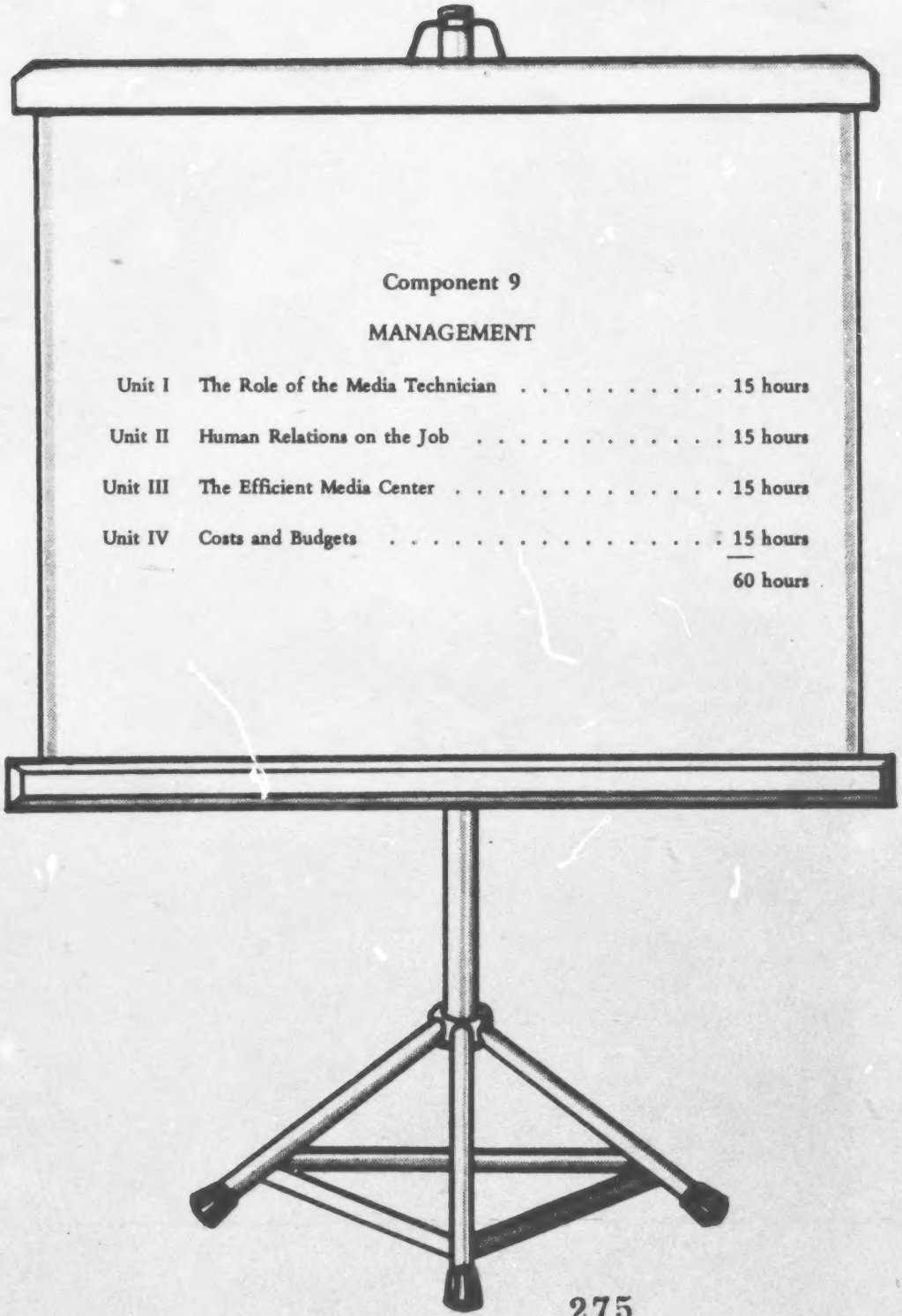
Selection of 3 Kodak curved-field projection lenses each in 3 focal lengths, set of 9 lenses per class.

Large, flexible, rear-projection screen with external frame, laced construction, Polacoat or equivalent, 8'x10' minimum, three per class.

Motorized dimmers (1000-watt capacity) variable rate, commercially built or constructed by students (min. 4 per class)

Kodak bifocal converter (1 per 5 students)

Second Year



Component 9

MANAGEMENT

| | | |
|---|---|---|
| Unit I | The Role of the Media Technician | 15 hours |
| Unit II | Human Relations on the Job | 15 hours |
| Unit III | The Efficient Media Center | 15 hours |
| Unit IV | Costs and Budgets | 15 hours |
| | | 60 hours |

## Component 9 – Management

### Unit I – The Role of the Media Technician

(15 hours)

**Specific Objectives**

The student will demonstrate an understanding of the role of the media technician by doing the following:

1. Outline the duties of the multi-media technician in the school situation.
2. Make an outline of the various areas of society that utilize the different types of media.
3. Develop a personal resume and prepare for job interviews.

**Basic Content**

1. Duties of media technician
   a. Routine maintenance of equipment and control systems
   b. Operation of equipment
   c. Creation of materials
2. Areas of possible employment
3. Personal resume
4. The job interview

**Suggested Learning Activities**

Note: This component can be handled in a classroom, with some work done by the students after school hours.

| Topics | Activities |
|---|---|
| 1. Duties of the multi-media technician | |
| a. Promote trouble-free operation of department. | The teacher will write the three major categories of duties on the chalkboard, across the whole board. Then the students will volunteer specific tasks as they exist in the operation of the multi-media center in the school, and the class will decide in each case where that task belongs. |
| (1) Equipment maintenance | |
| (2) Inventory-control system | |
| (3) Circulation system | |
| b. Operate equipment of all sorts. | The teacher will make a complete outline on the chalkboard, and the students will do the same in their notebooks. |
| c. Assist in creating materials in the various media, as required. | |

A class discussion may be held on the types of tasks that various students find most enjoyable, and why; least enjoyable and why; and what, if anything, can be done to improve the latter.

2. Areas of possible employment

   a. Educational institutions – various levels
   b. Business and industry
      (1) Industrial training departments
      (2) Sales and advertising departments
      (3) In-house publications
   c. Libraries, museums
   d. Audiovisual industry itself
   e. Commercial and educational communications industries – TV, newspapers, magazines
   f. Government agencies – various levels

With the instructor's help, the class will discuss the types of media used by each type of organization listed, and the types of work available in each for media technicians. The instructor and students should also name specific organizations that they know of, the sorts of media used by them, and other sorts that might be used.

The students will take notes and make an outline on this topic, including the specific examples mentioned, to be used as reference when seeking employment.

3. Personal resume

The class will discuss the sorts of information that should go into a personal resume.
Each student should prepare a resume and have a portfolio of his/her artwork, photography, drafting work, etc.

4. The job interview

The students will role-play job interviews.

## Unit II – Human Relations on the Job

(15 hours)

**Specific Objectives**

The student will demonstrate specific attitudes and behaviors required for successful functioning within educational and industrial environments, by doing the following:

1. State and explain the personal qualities needed for success in a job.
2. Cite significant personal qualities that make for a good relationship with other personnel and with superiors.
3. Describe the staff-line chain of command and how it affects the media departments in schools and in industry.

**Basic Content**

1. Qualities needed for job success
2. Positive human relations
3. Irritants on the job
4. Staff-line chain of command
5. Relations with superiors

**Suggested Learning Activities**

| Topics | Activities |
|---|---|
| 1. Qualities needed for success in the job<br>a. Ability to work with others<br>b. Good judgment<br>c. Energy and ambition – willingness to assume responsibility<br>d. Desire to keep learning<br>e. Resourcefulness, helpfulness<br>f. Ability to concentrate on the job<br>g. Dependability<br>h. Ability to work under pressure<br>i. Orderliness<br>j. Care with equipment<br>k. Frugality – economical use of supplies<br>l. Punctuality<br>m. Good health – few absences<br>n. Personal neatness and cleanliness | The class will discuss each quality and how its lack can affect others, both in the department and in the department's "clients." Students should suggest possible consequences in terms of monetary loss also.<br><br>A representative from a local industry can discuss the subject from the point of view of management. |

2. Positive human relations

| | |
|---|---|
| a. Recognizing the feelings of others – ability<br>b. Congeniality to critize constructively, friendliness, and politeness | Students will role-play situations developed and scripted by them. These can be done on TV tapes. |
| c. Cheerfulness<br>d. Cooperation, teamwork<br>e. Neatness and cleanliness<br>Body hygiene<br>Clothing, shoes<br>Hair<br>Beard, mustache, sideburns | Class will discuss the problem of sociability on the job, and where it ceases to be a factor improving relations and becomes an economic waste to the employer. |
| 3. Irritants on the job | Without naming names, students will give examples of behavior that have irritated them.<br><br>Students will roleplay situations on TV tape. |
| 4. Staff-line chain of command | |
| a. Organization in a typical school<br>b. Organization in a typical large industry | Instructor will display charts of different organizational setups, and will discuss with the students the advantages and disadvantages of the various arrangements. |
| c. Organization in a typical small business | The students will draw up an organization chart for a media department in a hypothetical school or industry. They will state the limits of the authority and responsibilities of each person and the qualifications required for each job. |
| 5. Relations with superiors – qualities needed | |
| a. Respect<br>b. Loyalty<br>c. Initiative, helpfulness<br>d. Dependability<br>e. Industriousness | The students will discuss reasons for getting along with their superiors.<br><br>The students will discuss the meaning of each quality and how the lack of each affects the superior. |

## Unit III – The Efficient Media Center

(15 hours)

### Specific Objectives

The student will demonstrate an appreciation of the factors that make for a well-run media center, as follows:

1. Analyze factors that contribute to efficiency and evaluate existing practices in the school's media center.
2. Calculate the monetary loss from wasteful practices.
3. Explain several causes of accidents and how accidents can be prevented.
4. Explain various ways of protecting equipment from failure or breakdown.
5. Order materials so as to minimize costs.

### Basic Content

1. Factors making for efficiency
2. Eliminating waste
3. Safety
4. Care of Equipment
5. Use of price lists in ordering

### Suggested Activities

| Topics | Activities |
|---|---|
| 1. Factors making for efficiency | |
| a. Preventive maintenance of equipment | The class will discuss, giving specific examples that they have heard of, how lack of routine maintenance can cause serious upset of plans and waste of time. |
| b. System for equipment circulation<br>Shelving<br>Scheduling<br>Delivery of equipment<br>Return of equipment<br>Record-keeping | The class will visit a media center in another school and in an industry or governmental office. Students will compare these systems for circulation of equipment with the system in their own school. On the basis of this comparison and discussion, the students will draw up a list of suggestions to be presented to the director of the school's media center. |
| c. Inventory-control system | The class will evaluate the school's system for control of spare parts and supplies – projector bulbs, films, chemicals, etc. They should make appropriate recommendations if the system does not appear adequate to insure replacements whenever needed. |

| | |
|---|---|
| d. Efficient shop layout | The student will draw a diagram of an efficient media production center and defend it before the teacher and other students. |
| e. Policies on work breaks, sociability, etc. | The class will discuss the pros and cons of coffee breaks and socializing. |
| 2. Eliminating waste | |
| a. Cost of time wasted<br>b. Cost of materials wasted<br>c. Cost of repairs due to carelessness | The teacher will construct several hypothetical examples of waste involving lateness, fooling around, carelessness, etc., and the class will make an approximate calculation of the total monetary cost and the loss in production time.<br><br>Poster contest on eliminating waste. |
| 3. Safety | |
| a. In the shop<br>b. In operating equipment<br>c. Use of equipment by unauthorized persons | The class will discuss the causes of accidents and how they can be prevented.<br><br>The class will discuss the reasons why unauthorized persons must not be permitted to use the equipment.<br><br>Poster contest on safety. |
| 4. Care of equipment | |
| a. Need for routine maintenance | The class will list major items of equipment, where each is most likely to develop problems, and recommended preventive maintenance for each. If not already there, labels should be affixed to each piece of school media equipment, giving directions for routine maintenance. For each piece of equipment, a list should be made of spare parts that should be kept on hand. |
| b. Repairs made as soon as possible | The class will discuss the consequences of delays in getting back equipment out for repair. |
| c. Protection against dust, cold, heat, dry air, moisture, etc. | The student will list all equipment and supplies that need special protection from any of these conditions. |

| | |
|---|---|
| d. Service contracts | The class will discuss the types of equipment that should be under service contracts and the types that need not be, taking into consideration the expertise available in the shops.<br><br>The students should read sample service contracts and discuss what the service company will do under the contract and what it will not do. |
| 5. Use of price lists in ordering | Given a list of several items (supplies) needed, the student will study prices of comparable items in different price lists and prepare an order or orders. Available quantity discounts should be taken into consideration in line with actual quantities needed. |

## Unit IV – Costs and Budgets

(15 hours)

### Specific Objectives

The student will demonstrate competence in the financial aspects of using media, as follows:

1. Participate in various activities to keep up to date on the equipment available in the field.
2. Develop cost-lists for the use of the different media.
3. Demonstrate an understanding of the cost-effectiveness of the various media.
4. Determine the cost of a planned media package.
5. Help to prepare working figures for an annual budget.

### Basic Content

1. Need to keep up to date on available equipment.
2. Costs of using various media.
3. Cost-effectiveness of various media.
4. Determining the cost of a media package.
5. The annual budget

### Suggested Learning Activities

| Topics | Activities |
|---|---|
| 1. Need to keep up to date on available equipment. | The class will establish a wants-and-needs card file, based on the various activities in this section. |
| a. "Spending money to save money" | The teacher and students will give examples of how up-to-date equipment can save money. |
| b. Trade manuals – books and periodicals | The class will maintain a file of trade manuals, which the students will borrow. They will report on interesting articles and on new equipment shown in the advertisements. |
| c. Manufacturers' catalogs | The class will maintain a file of current catalogs of all major manufacturers in the field of media, and price lists from dealers. |

d. Trade shows

The instructor and class will discuss what to look for at a trade show. The students will attend any trade show possible and collect handouts and catalogs.

e. Equipment demonstrations

The class can request demonstrations and/or attend any that are available.

2. Costs of using various media – Equipment, labor, and materials

a. Visual displays and posters
b. Photographs
   Black and white
   Color
   Enlargements
c. Brochures
   With live drawings
   With half-tone illustrations
d. Projectuals
   Standard transparencies and overlays
   Animated transparencies
e. Slide presentations
   Silent
   With sound-manual control
   With sound-synchronized control
f. Filmstrips
   Silent
   With sound-manual control
   With sound-synchronized control
g. Single-concept cassette films
h. Black-and-white films – 8mm, 16mm
   Silent
   With sound
i. Color films – 8mm, 16mm
   Silent
   With sound
j. Audio recordings
   Tapes
   Tape cassettes
k. Video recordings
   Black-and-white videotapes
   Color videotapes
l. Dissolve techniques

Using catalogs and price lists, the students will make up lists of the cost of equipment and supplies for the various media. Each student can take a few items to research, and all the data can be combined in a single card file.

The class will discuss each medium in detail, considering (1) cost of initial equipment and maintenance, (2) cost of supplies, and (3) cost of labor for an average production in each field.

3. Cost-effectiveness of various media

The class will discuss the cost vs. effectiveness of the different media when used for appropriate projects. They will reach some general conclusions as to which of the media are most capable of delivering effective instruction at relatively low cost.

4. Determining the cost of a media- or multi-media package

Assigned a particular media- or multi-media package, the student will compute the cost of producing it to within 10 percent of the actual cost, considering

a. Cost of labor
b. Cost of time for relief personnel, particularly for teacher substitute
c. Materials costs
d. Cost of energy consumption
e. Allocation of part of cost of delivery system.

4. The annual budget

a. Concept

The students will examine a copy of last year's budget for the media center and discuss it.

b. Preparation

(1) Need to determine policy for coming year – growth of workload, new projects, etc.

(2) Need to anticipate price changes

(3) Compiling of figures

The class will work up the figures for a hypothetical budget based on

a. Last year's budget
b. Items 4-b (1) and (2)
c. Costs as compiled for item 2 above
d. Wants and needs file